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Paper Output Declined 12 Per Cent in 1938

Production of All Grades of Paper Dropped 12 Per Cent To Total 11,327,500 Tons Compared With 12,837,003 Tons In Previous Year—Operating Ratio For Entire Industry Averaged 74 Per Cent In Unusual Period.

By M. C. Dobrow, Executive Sec., Writing Paper Mfrs. Association

After two years of successive new high records, paper production last year suffered a decline. But the total 1938 production was only 12 per cent less than the all-time record production of 1937. Wrapping and paper board showed comparatively small declines. Printing paper grades declined about 16 per cent. In view of the severity of the general business recession, these declines for paper indicated continued consumption vitality.

Relatively High Rate of Consumption

From the beginning of the recession late in 1937 throughout 1938, the reports indicated a continuation of a relatively high rate of paper consumption. Merchants and converters were depleting their paper inventories, and when such inventories were depleted, continued and improved consumption brought about increased demand on mills for tonnage. Fine paper merchants' inventories showed a decline of 15 per cent during 1938.

The paper industry began 1938 at extremely low levels. During the first six months of the year industry operations were at a low ebb, but the volume of paper production improved almost at the same time as general business. The statistical level of general business and the paper business in particular during the fourth quarter was not fully appreciated at the time. The industry ended 1938 and began 1939 optimistically based on marked indications of improved business prospects.

Writing paper shipments in the fourth quarter of 1938 were 38 per cent higher than the very depressed fourth quarter of 1937. In the first six weeks of the new year, writing paper shipments were 18 per cent higher than they were in the same period of 1938.

The revised figures for 1937 placed writing paper production at 584,147 tons which fell short of expectations to better the previous high of 607,590 tons in 1929. Perhaps some of the difference is to be accounted for by the inclusion in the more recent figures, of tablet and envelope in the book paper classification. 1938 production of writing paper is estimated at 510,000 tons, a decline of 13 per cent from 1937 production.

Although writing and book grades gave a good account of themselves in a fairly high rate of sustained consumption during the depression period, it is evident that while the wrapping and paper board grades continue to find new and increased uses, this does not apply to the so-called cultural grades.

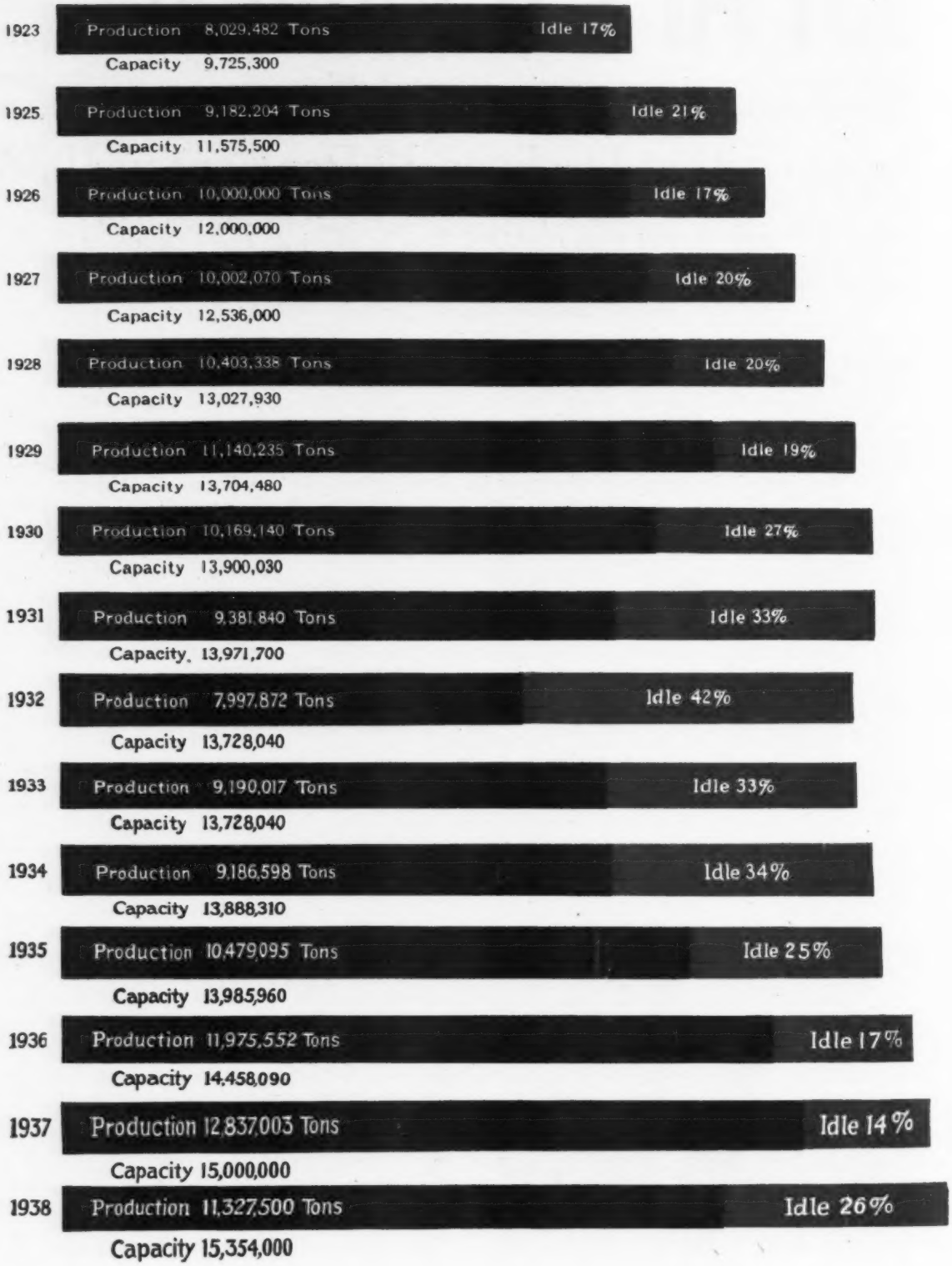
Paper Mill Expansion

The United States census placed the capacity of all paper-making machines in 1936 at 14,458,090 tons. The available capacity for 1937 was estimated at 15,000,000 tons. In 1938 there were installed new machines with an annual capacity of 600,000 tons of which 491,000 tons were for paperboard, 44,000 tons for wrapping, 31,000 tons for book, 18,000 tons for tissue and 16,000 tons for building papers. Of the 600,000 tons of new capacity installed, only 354,000 tons were ready for operation during the year, making the total available machine capacity for 1938, 15,354,000 tons. In addition there are now being installed, or in the course of construction, new machines with a capacity of approximately 200,000 tons which would make the annual capacity 15,800,000 tons at the end of 1939.

U. S. CAPACITY AND PRODUCTION OF PAPER BY GRADES

	1929			1936			1937			1938, Estimated		
Grade	Capacity, Tons	Actual Production, Tons	Per cent	Capacity, Tons	Actual Production, Tons	Per cent	Capacity, Tons	Production Census, Tons	Per cent	Capacity, Tons	Production, Tons	Per cent
Writing Paper ..	670,000	607,590	91	728,810	602,329	83	731,000	584,147	80	732,000	510,000	70
Cover Paper....	32,000	28,072	88	37,200	25,524	69	37,000	24,437	66	37,000	21,500	58
Book Paper (Uncoated) ...	1,700,000	1,497,912	88	1,837,680	1,438,046	78	1,890,000	1,561,074	83	1,900,000	1,296,800	68
Wrapping Paper.	2,000,000	1,605,783	80	2,180,850	1,879,323	86	2,236,000	2,053,387	92	2,300,000	1,897,000	82
Newsprint	1,695,080	1,409,169	83	1,007,810	938,287	93	1,010,000	960,663	95	1,010,000	833,000	82
Paperboard	5,696,870	4,451,187	78	6,511,860	5,454,637	84	6,891,000	5,802,036	84	7,100,000	5,137,000	72
Tissue Paper....	442,680	387,811	88	640,770	494,721	77	670,000	540,152	81	680,000	500,000	74
Building Paper..	850,000	659,178	78	728,190	549,701	75	735,000	608,086	83	772,000	568,000	74
All Other Paper.	617,850	493,533	80	784,920	592,984	76	800,000	703,021	88	823,000	565,500	69
Total	13,704,480	11,140,235	81	14,458,090	11,975,552	83	15,000,000	12,837,003	86	15,354,000	11,327,500	74

CAPACITY AND ACTUAL PRODUCTION OF PAPER MACHINES IN THE U. S. A.



Courtesy of M. C. Dobrow, Executive Secretary, Writing Paper Mfrs. Association.

The annual capacity of the United States paper industry may be summarized as follows:

1936 (actual)	14,458,090 tons
1937 (available)	15,000,000 tons
1938 (available)	15,354,000 tons
Beginning of 1939	15,600,000 tons
End of 1939	15,800,000 tons

Operating Ratios

The following table indicates the growth of the industry capacity and actual production, together with the operating ratios for the important years.

Year	Capacity, Tons	Production, Tons	Per cent
1899	2,782,200	2,167,593	78
1909	5,293,400	4,216,708	80
1920	8,540,000	7,334,600	86
1925	11,575,500	9,182,204	79
1929	13,704,480	11,140,235	81
1930	13,900,030	10,169,140	73
1931	13,971,700	9,381,840	67
1932	13,728,040	7,997,872	58
1933	13,728,040	9,190,017	67
1934	13,888,310	9,186,598	66
1935	13,985,960	10,479,095	75
1936	14,458,090	11,975,552	83
1937	15,000,000	12,837,003	86
1938	15,354,000	11,327,500	74

Year after year consumption and price trends of paper have been moving in opposite directions. Each year, with few exceptions, the average price which the consumer has paid for his requirements has decreased. The "real" price of paper, its exchange value for other commodities, has gone down, and yet the industry has remained fairly intact because of two important factors,—continued technological improvement with lower production costs, and ever increasing consumption to take up the increased mass output of new capacities. This was true of the industry as a whole in all its history up to the beginning of the present decade. Since the beginning of the '30s, it has continued true for wrapping paper and paper board. The so-called white or cultural papers have not continued to demonstrate further increases in consumption.

What Happened to Pulp

The condition of the pulp market throughout 1938 was soft and spotty. Such weakness was to be expected in the early months, but was surprising in the latter part of the year when consumption of pulp improved consistently every month. It can be explained by the accumulation of stocks at American ports and especially at European mills. The desire to sell these stocks as well as future production, competition of American and European mills, and further depreciation of Scandinavian currencies were among the economic forces that brought pulp prices back to about the 1936 level.

A combination of white pulp figures, that is, bleached sulphite, unbleached sulphite, bleached sulphate and soda showed that the United States production declined 18 per cent for 1938 compared with 1937. Imports declined 28 per cent. Exports declined 58 per cent. Total available supply of these grades for self-contained and converting mills in 1938 was 19 per cent less than in 1937. This was somewhat greater than the decline in pulp consumption or white paper production. Atlantic Seaboard stocks of bleached sulphite declined during the year, but stocks of unbleached sulphite remained fairly high.

The competition from the rayon industry for pulp supplies which brought about scarcity prices in 1937 was not so evident in the past year. Nevertheless the total world's consumption of pulp by the rayon and staple fibre industry in 1938 exceeded even the record consumption of 1937. Production of rayon yarn declined very sharply in the first half of the year. The precipitous increase in the second half of the year was not sufficient to make up the loss, although the comparisons in the second half of the year were very much improved. Rayon yarn production in 1938 was 19 per cent less than in 1937. On the other hand, staple fibre production increased 50 per cent. Both combined showed an increase of 4 per cent over 1937.

In the United States alone, rayon yarn production in 1938 declined 20 per cent; staple fibre increased 47 per cent; both combined showed a decrease of 16 per cent. In Japan, the other large producer, rayon production went from 334,350,000 pounds in 1937 to approximately 200,000,000 pounds in 1938, a decline of 40 per cent. Staple fibre production, however, increased from 174,755,000 pounds to nearly 350,000,000 pounds, or 100 per cent.

The following is a summary of the world's production of rayon and staple fibre:

	(In Thousands of Pounds)		
Year	Rayon Yarn	Rayon Staple Fibre	Total Rayon
1920	33,100	.....	33,100
1930	451,200	6,250	457,450
1935	939,550	139,340	1,078,890
1936	1,021,015	298,060	1,319,075
1937	1,205,000	618,000	1,823,000
1938	975,000	925,000	1,900,000

In 1936 world production of rayon, staple fibre and cellophane amounted to approximately 1,405,000,000 pounds. In 1937 the world's consumption of these dissolving pulp products was in the neighborhood of 1,900,000,000 pounds, and last year it exceeded 2,000,000,000 pounds, a new high record. It is safe to estimate that these industries now use more than 1,000,000 tons of the world's production of bleached sulphite. This represents about 30 per cent of the present world's production.

Such statistics of the pulp industry as were available in this country indicated steady liquidation of the top-heavy inventory situation of a year ago. Continued increases in pulp consumption by the paper industry and the rayon industry cannot help but have a beneficial effect on the pulp markets of the world.

Effect of Maximum Hours Provisions

Last October, the Fair Labor Standards Act became effective. For the first year this Act limits hours of employment to forty-four per week, except at time-and-one-half for overtime, with a minimum wage rate of 25c per hour. The Act provides that the industry committee to be appointed by the Administrator may raise the minimum but not to exceed 40c per hour.

In the second year of operation under the Act, which begins in October, 1939, the maximum hours will be forty-two per week, hours worked above forty-two must be compensated for at one and one-half times the regular rate which the employee receives. The minimum wage rate becomes 30c per hour. Within another seven months the paper industry will again have to adjust production schedules, this time to a forty-two hour week to meet the requirements of this Act.

A year hence, in October, 1940, the forty-hour week will be established by law as the maximum hours of work except at time-and-one-half for overtime which will require further adjustments in operations.

Although the new minimum hourly rate of 30c effective next October is applicable to all industry, it is likely that by that time the Paper Industry Committee will have been appointed and a minimum rate for the paper industry established, possibly 35c, but not to exceed 40c per hour.

As the paper industry is not a substandard industry, the establishment of 35c per hour would make for very little, if any, hardship in the industry as a whole. However, if a rate of 40c were promulgated, it is quite likely that it would result in the elimination of female employees in certain departments of paper mills which now employ women at a rate not exceeding 35c per hour.

The greatest concern of the paper industry is not with the minimum wage but with the maximum hour provisions of the Fair Labor Standards Act. Apparently in drafting the law there was little or no consideration given to continuous operating industries such as the paper industry. This inflexibility has already made itself felt in disrupted production routine and increased production costs and with the reduction of hours to forty-two in 1939 and forty hours in 1940, they will be further pronounced.

Reduced Mill Production Lowers Demand For Chemical Below Average Year

Written Especially for the Annual Review Number of the PAPER TRADE JOURNAL

During the first part of 1938 paper mills operated at a greatly reduced rate, around a level of 65 per cent. During the last half of the year, however, this rate was increased to an average of 80 per cent. For the whole year the operation was around a level of 70 to 72 per cent. Therefore the total amount of chemicals used was somewhat less than an average year and of course somewhat less than 1937. The outlook for 1939 is promising.

Casein

Production during 1937 and 1938 in this country was quite heavy. We would say that production was 25 per cent to 35 per cent heavier than the average year. In recent years the American production of Casein has been ample enough to take care of the entire requirements of this country. Prices during 1938 were below average and fluctuated between 7c and 10c. Prices for 1939 on the average should be slightly higher as stocks both in producers and consumers hands as of the first of January are said to be lower than they were a year ago and therefore heavier buying is expected in 1939.

China Clay

Consumption in 1938 was somewhat lighter than in 1937. Prices however remained firm. Due to higher labor schedules and new taxes it is expected that prices on clay in 1939 will hold. The price of imported clay is also firm. However, the duty on imported clays was reduced 75c a ton with the new reciprocal tariff on January 1, 1939. The present duty is $1.75 per long ton.

Rosin Size

Rosin and rosin size were firm during most of the year, but at a much lower average level than in 1937. The "G" Gum market fluctuated between $3.95 and $5.50. A large quantity of the rosin crop in 1938 was put under Government loan. It is believed that this large holding of rosin, with a new crop which should begin to come in within another sixty days, should have a leveling effect on rosin prices in 1939. Of course, if consumption greatly increases in this country as well as in foreign countries, the whole picture may change. The average price for 1939 should be somewhat higher than for 1938.

Sulphate of Alumina

The demand for sulphate of alumina during 1938 was fair. Prices averaged a little lower on the commercial grades but the trend is quite firm for the year 1939. Prices on iron free sulphate of alumina were on a lower level than for 1937. Prices on this material today are very firm.

Salt Cake

Prices on salt cake were quite firm during the year. A good percentage of the cake used is imported from Europe. Consumption, due to the reduced rate at the kraft mills, was considerably lower than 1937 but prospects look more favorable for 1939.

Book Paper Output in 1938

Production of Uncoated Book Paper in 1938 was 17 per cent less than in 1937 and was also under the 1936 production figure. The greatest drop occurred during the first half of 1938 when production was substantially under the same period of 1937. In July 1938, contrary to the usual seasonal drop, an increase occurred and, from that time on the pickup was greater than the usual seasonal trend. The increase in production was sustained up to December which was somewhat abnormal; as there is usually a slight falling off in October. Production in December, 1938, was almost 20 per cent ahead of December 1937. Indications point to the maintenance of this trend during the first part of 1939.

Chile To Build New Writing Mill

Work will be started soon on the building of the Fabrica de Papel y Celulosa, according to reports from the office of the American Commercial Attache, Santiago. The mill is to be erected near the city of Valdivia, 536 miles south of Santiago, and will thus be located near the principal Chilean timber stands. The machinery has been acquired in Germany and is reputedly the most modern which could be obtained. It is hoped to have the mill in operation by January 1, 1940. The mill will be equipped to produce about 5,000 metric tons of writing and printing papers, 3,500 tons of chemical pulp, and 1,500 tons of mechanical pulp annually.

Newsprint Production of North America Averaged 67 Per Cent of Capacity

By R. S. Kellogg, Secretary, Newsprint Service Bureau

Production of newsprint paper in North America in 1938 was of the same order as in 1931 and only 24,000 tons more than in that year.

The 3,713,000 tons turned out last year were 1,230,000 tons or 25 per cent less than in 1937—the largest drop in both quantity and percentage ever experienced in the industry from one year to a following one.

The 1938 production was made to the extent of 2,625,000 tons or 71 per cent in Canada, 820,000 tons or 22 per cent in the United States and 268,000 tons or 7 per cent in Newfoundland. The decrease compared with the previous year was 28 per cent in Canada, 23 per cent in Newfoundland and 13 per cent in the United States. Canadian output was slightly more than in 1934 while United States production was the least of any year since 1903. Newfoundland tonnage was approximately the same as in 1933.

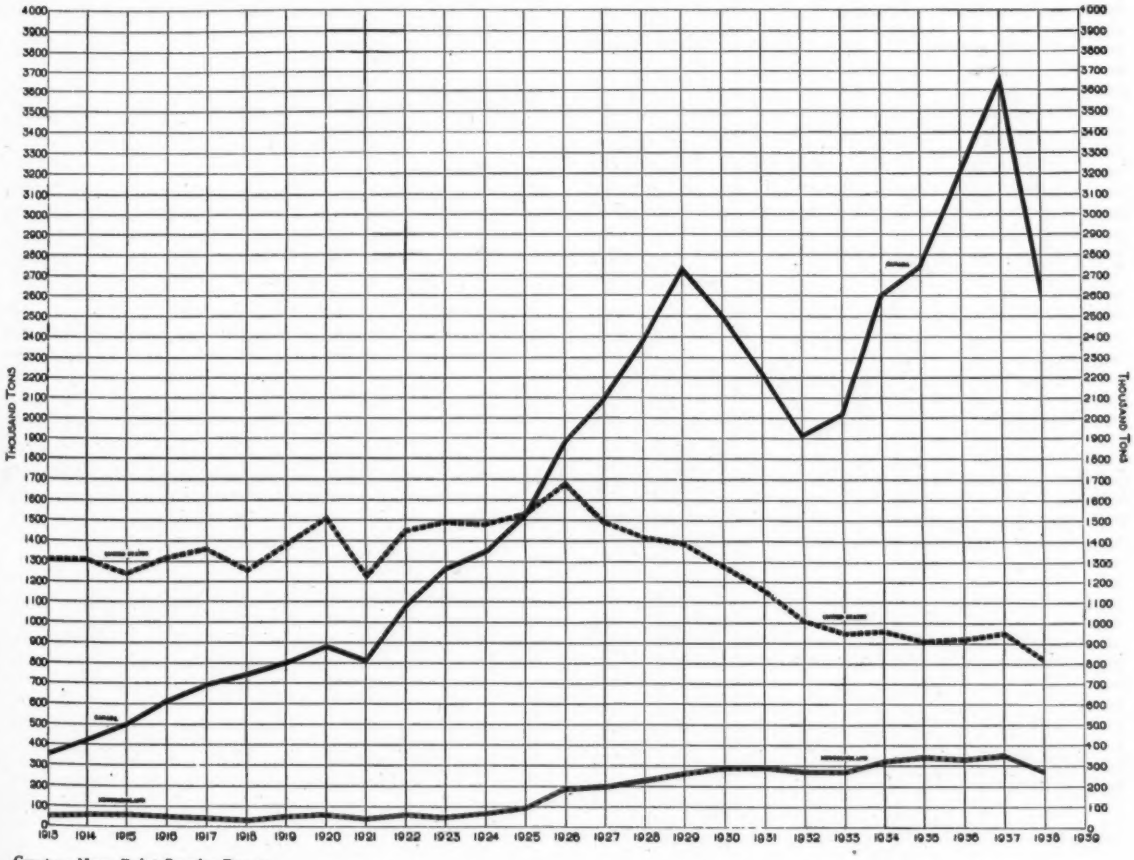
Shipments from Canadian mills were 2,506,000 tons, from United States mills 818,000 and from Newfoundland mills 264,000 tons, a grand total of 3,588,000 tons or 125,000 tons less than production. These shipments left the mills with 227,000 tons on hand December 31, 1938, compared with 102,000 tons for the corresponding date a year earlier.

The 1938 output of newsprint was made at approximately 67 per cent of capacity operation of the North American industry. Canadian mills average about 63 per cent, Newfoundland mills 72 per cent and United States mills 84 per cent. The American Paper & Pulp Association reports that 300 mills in the United States, making every kind of paper, averaged 72 per cent of their rated capacity operation in 1938.

North American newsprint production of 3,713,000 tons last year was half of a world production of around 7,400,000 tons. The decrease in world production from 1937 was about 18 per cent, the industry elsewhere having had a higher operating ratio than in America.

Exports 30 Per Cent Lower for Year

Exports of newsprint paper from Canada during 1938 are officially reported in round numbers to have been 2,425,000 tons, a decrease of 1,030,000 tons or almost 30 per cent from the record in 1937. The 1,-



Courtesy News Print Service Bureau

NEWS PRINT PRODUCTION UNITED STATES, CANADA, NEWFOUNDLAND, 1913-1938.

938,000 tons shipped to the United States were 961,000 tons or 33 per cent less than in the preceding year, while the 486,000 tons sent overseas were 70,000 tons or nearly 13 per cent less than in the preceding year. The 1937 overseas exports of newsprint from Canada were the smallest of any year since 1934.

Last year's overseas newsprint exports from Canada went to the extent of 44 per cent to Australia-New Zealand, 39 per cent to the United Kingdom (including Ireland) and 7 per cent to South America. There were large gains in last year's shipments over the preceding year to the United Kingdom, Ireland and Australasia. On the other hand, there was a decrease of 67 per cent in shipments to South America—principally Argentina—a large relative decrease in shipments to Cuba, while only 1,800 tons went to Japan and China compared with 45,000 tons in 1937. Striking also was the shipment of only 94 tons of Canadian newsprint to Mexico last year compared with 19,000 tons in 1937. Mexico, as is generally known, has expropriated the oil of foreign producers in that country and is bartering it to Germany for newsprint paper.

Overseas exports of newsprint from Newfoundland are reported to have been 204,000 tons in 1938, the destination of course, being chiefly England. This was a decrease of 37,000 tons or 15 per cent from 1937.

Overseas exports from the United States totaled only 6,000 tons and were the least of any year on record. They went chiefly to Cuba and Central America.

Imports Decline 31 Per Cent

Imports of newsprint paper into the United States during 1938 from all sources amounted to 2,275,000 tons, a decrease of 1,042,000 tons or 31 per cent from 1937. While these imports were two and three-quarter times domestic production, they were the smallest of any year since 1934 because of accumulated stocks in the hands of United States publishers and smaller consumption. These imports came to the extent of 86 per cent from Canada, 11 per cent from Europe and 3 per cent from Newfoundland.

The newsprint paper which came into the United States last year from Europe to the extent of 243,000 tons was supplied in the amount of 151,000 tons by Finland, 71,000 tons by Sweden, 11,000 tons by Norway and 10,000 tons by Germany. While there was 51,000 tons or 17 per cent less newsprint taken into the United States from Europe last year than the year before, the decrease was by no means evenly distributed. In 1938, for instance, Sweden supplied 71,000 tons, a decrease of 30,000 tons from shipments to the United States in 1937. The 11,000 tons which came from Norway last year were 14,000 tons less than in the preceding year. Receipts of 10,000 tons from Germany were a decrease of 3,000 tons from 1937. On the other hand, the 151,000 tons of newsprint imported into the United States in 1938 from Finland were only 4,000 tons or 3 per cent less than in 1937.

The manufacturing capacity of the Finnish newsprint industry was substantially enlarged in 1938, making certain that competition from that source will be maintained in full vigor.

Stocks at North American Mills

Stocks of newsprint paper at North American mills —Canada, United States, Newfoundland—on December 31, 1938, totaled 227,000 tons. Stocks on hand or in transit to the publishers reporting to the ANPA on the same date were 315,000 tons. If it is assumed—as seems reasonable—that publishers not reporting to the ANPA held stocks in the same proportion, the total of mill and publishers stocks at the end of the year was 625,000 tons or a decrease of 244,000 tons from the quantity held on December 31, 1937. This represents a substantial improvement in the situation which will be reflected in mill operating ratios in 1939.

Close to a Normal Situation

The publishers reporting to the ANPA began 1938 with nearly 614,000 tons on hand or in transit or 75 days' supply at the current rate of consumption and came to the end of the year with 315,000 tons or 41 days' supply. They used 229,000 tons out of their stocks during the year. The 315,000 tons which these publishers had on December 31, 1938, was the smallest quantity they have had since March 1937 and is close to a normal situation. While manufacturers' stocks are still heavy, it will not require much pick-up in consumption to bring them also down to normal and thus once more have a situation in which current consumption is closely reflected in current production.

Consumption Decreased 322,000 Tons

The publishers reporting to the ANPA used in round numbers 2,738,000 tons of newsprint paper in 1938—a decrease of 322,000 tons or 10½ per cent from the amount used in 1937. Their consumption was, in fact, very close to that of 1928.

As was anticipated earlier, the last quarter of 1938 was the best one. Consumption by these publishers in the final three months totaled 736,000 tons and averaged but 6 per cent less than in the final quarter of 1937. In June—the low point of the year—they used 16 per cent less newsprint than in June of the preceding year.

On the assumption that the publishers reporting to the ANPA used 79.2 per cent of all the newsprint consumed in the United States—which is justified by an analysis of figures of domestic production plus imports and changes in stocks—the actual consumption in 1938 was around 3,458,000 tons. This was a decrease of 372,000 tons or 9.7 per cent from the amount of newsprint used in the country in 1937 and was approximately midway between the tonnage used in 1935 and in 1936. It was, in fact, but little more than the consumption in 1927. That year, however, the 3,445,000 tons used was equivalent to 58.2 pounds per capita, whereas the consumption in 1938 was equivalent to 53.1 pounds per capita. This was 6.2 pounds per capita less than in 1937.

Explanations of Last Year's Decrease

The explanations of last year's decrease in newsprint consumption are, of course, obvious. It was due to the heavy decrease in the volume of advertising, the small decrease in circulations and also to the economies effected by publishers through the use of narrower rolls and in other ways. Some partial statistics upon changes in roll sizes made within the past two years indicate a saving of at least 25,000 tons by the papers making these changes over the amount of paper which they consumed in 1937. A considerable number of newspaper suspensions and mergers were also more than a negligible factor in the decreased consumption of newsprint paper in 1938.

Paperboard Industry Makes Fine Showing in Difficult Business Period

By Grafton Whiting, National Paperboard Association

The total production of the paper industry as published by the U. S. Bureau of the Census shows a total of 12,837,000 tons in 1937, a new all-time high 7 per cent above the previous record of 11,975,500 in 1936, and 22.5 per cent above the 10,479,100 tons made in 1935.

The principal divisions of the industry and the per cent that each bears to the whole are listed below:

Divisions	1935	1936	1937
Paperboard	42.9%	43.0%	43.5%
Wrapping	15.6	15.7	16.0
Book Paper	12.2	12.0	12.2
Newsprint	9.0	7.9	7.5
Writing	4.9	5.0	4.5
Building	4.2	4.6	4.7
Others	11.2	11.8	11.6
Total	100.0%	100.0%	100.0%

The continued growth of the paperboard division in relation to the other branches indicates the success attained in developing new uses for its products and facilities for supplying the demands.

The year 1938 will show for paperboard a total production in excess of 4,800,000 tons—a decrease of about 11 per cent compared with 1937. In view of the extent to which the recession in general business has affected all industries, the falling off in paperboard is less severe than anticipated.

"Paperboard," as the term implies, is a product made on a paper machine in the same manner as paper, but of a greater thickness, to produce a board suitable for making shipping containers and cartons. It is 12 points (12/1000 of an inch) or more in thickness, formed into a board suitable for a protective covering that will withstand hard usage.

There are 380 multicylinder and fourdrinier machines recognized as producers of paperboard, of which 25 are engaged primarily in making other grades with occasional runs of paperboard. Not included in the general term "paperboard industry" are such grades as cardboard, coverboard, builders board and leather board, which are not fabricated into boxes, but there are included the production of corrugating materials (.009 of an inch thickness) and some of the lighter weight materials made for the corrugated shipping container industry.

Two general divisions are recognized—Containerboards and Boxboard. Chart I shows the relative importance of each during the past four years. The position in 1938 is much the same as that in 1935—51.4 per cent containers and 48.6 per cent boxboard. The years 1936 and 1937 developed a greater proportionate demand for container-boards than for boxboard, which indicates that shipping containers tend to fluctuate with the trends in general business more distinctly than do the items made from boxboards. It should be noted that the subdivision "other" has maintained an increase throughout the 4 years' display. It is always a source of satisfaction to find an increase in this class since the grades included

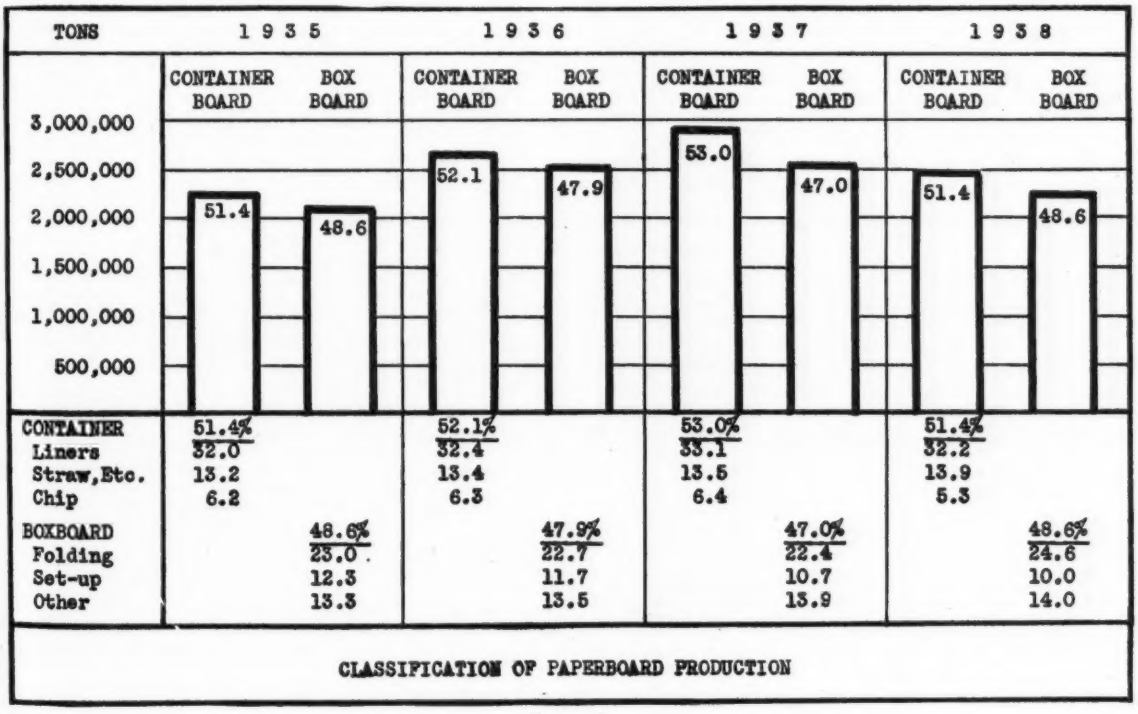


CHART I.

under this heading represent boards that do not enter into the highly competitive field of boxes, but at the same time are utilizing the productive capacity of the board machines. New uses for paperboard fall under this category and usually command higher prices to compensate for the ingenuity and work involved in development.

Raw Materials

There are two principal raw materials which enter into the manufacture of paperboard;—waste papers and pulp. Waste papers are collected from stores, office buildings and homes. These in turn are sorted into various grades depending upon the amount of reclaimable fiber remaining in the papers. The chief division are Mixed papers—low quality, Newspapers and a number of other grades representing the stronger and better fibers.

Pulp is derived from wood and is imported from foreign countries or is of domestic origin.

Waste Papers

The consumption of waste papers by paperboard mills during 1938 is estimated to be 3,200,000 tons—at a value exceeding $24,000,000.

There are certain grades of board made entirely of waste papers and others which call for waste papers and pulp. Some mills use only pulp in their output. If the latter are excluded, it is found that the average ton of board (2000 pounds) contains between 1,700 and 1,800 pounds of waste paper stock. The consumption by grades is Mixed Paper 39 per cent, News 25 per cent, and other grades 36 per cent. The average price per ton in New York was—Mixed $2.33, News $4.54; in Chicago—Mixed $4.34, News $6.46 Wide fluctuation between the high and the low prices is detrimental to the dealers and mills alike. Last year the spread above or below the average was less than $1.50; unlike 1937 when in the Chicago area, a high of $15.00 and a low of $5.00 per ton was recorded. Other grades in both localities range at higher prices, depending upon the quality, but fluctuations this year were relatively less than in the cheaper grades.

Domestic and Imported Pulp

The pulp used in the United States is about ⅓ imported and ⅔ domestic supply. Sweden, Finland,

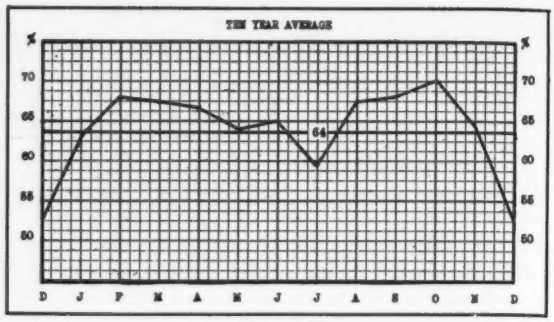


CHART II.

Norway send us 70 per cent and Canada 30 per cent. Of our domestic production the Northern states supply 34 per cent, the Southern 40 per cent and Pacific Coast 26 per cent. Exports of pulp consist largely of sulphite pulp shipped to Japan, our biggest customer. The following table gives the relative importance of the items:

Items	1937	1938	Per cent Decrease
Imports	2,394,500	1,722,400	28%
Domestic	6,600,000	5,640,000 E	14.5
Total	8,994,500	7,362,400 E	18.1
Exports	302,000	140,500	53.4
Net Available	8,692,500	7,221,900 E	17.0

E—Estimated.

The pulp situation was characterized by a large inventory at the opening of the year and overhanging contracts for purchases during 1938. With low consumption during the first half year, prices weakened and have not as yet shown signs of recovery. For example, domestic kraft pulp quotations dropped from an average of over $50.00 per ton for 1937 to $47.50 in January and $35.00 by the close of the year.

Imports of all grades dropped 28 per cent compared with 1937, but in the same period domestic production showed only 14.5 per cent loss. The capacity to produce all grades of pulp in this country was 7,676,000 tons in 1937, a gain of 711,000, or 10 per cent over 1936. 1938 shows a further gain of 1,055,000 tons over 1937 or a gain of 1,766,000 tons or 25 per cent over 1936.

It will take some time to assimilate all the new

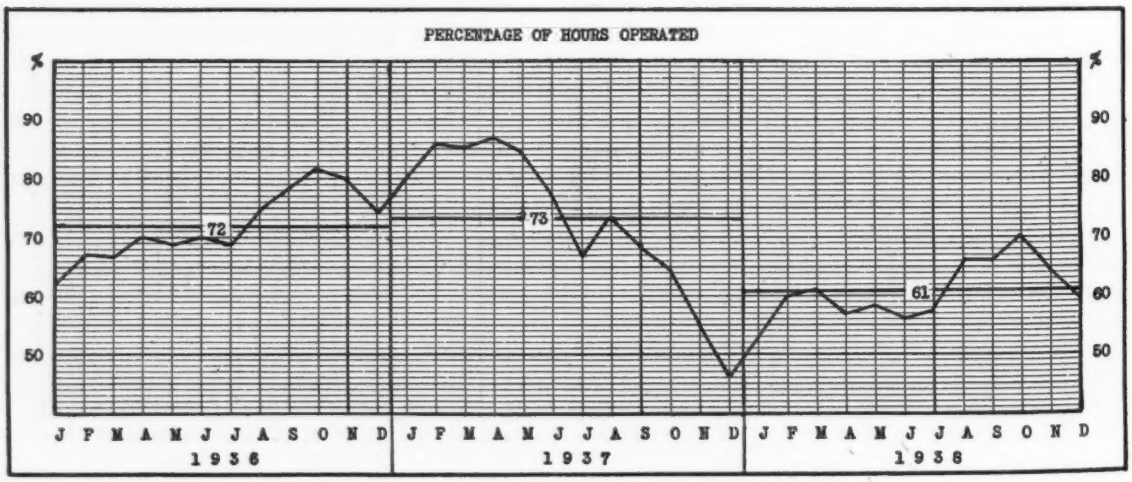


CHART III.

pulp capacity installed during the last two years. There are still over 1,700,000 tons valued at over $70,000,000 being imported, upon which further inroads will be made, but price competition must be met.

Changes in the source of supply are always accompanied by price fluctuations and unless consumption in this country and abroad increases substantially, the pressure of the new capacity upon the market will be felt.

Seasonal Variations

The flow of paperboard demand varies during the year in response to seasonal requirements of the fabricators of shipping containers and cartons. It is found that the average year has an upturn late in the first quarter which reflects requirement for the Spring flow of business and again in the preparation for the Fall business and Christmas trade. Chart II illustrates these changes and gives the activity for each month contrasted with the yearly average of 64 per cent. No one year will exactly follow the pattern which was developed by consolidating 10 years of records.

Paperboard Mill Activity

The term "Paperboard Mill Activity" is an expression in percentage of the operating time. A work week of 144 hours (6 days) is considered 100 per cent and the hours of actual operation during the week as reported, divided by 144, gives the per cent of activity.

Chart III shows the activity for the past 3 years and will be found to differ each year from the normal or average performance. A study of the past 12 years indicates that there are two general patterns which the activity follows. One is where the Spring demand is predominant, and the other where the Fall volume is the greater. Furthermore, each year that has a Spring pattern is followed by a year of lesser activity and each Fall pattern year precedes a year of greater activity. In the illustration given (Chart III) 1936 shows a fall pattern year and 1937 exceeded it in activity. 1937 however, was distinctly a Spring pattern and 1938 was of lesser activity. 1938 with a Fall pattern forecasts a better year in 1939. There does not seem to be any corollary between the degree to which pattern is marked and the amount of gain or loss in the succeeding year, but the annual growth in the industry has always been a factor on the favorable side. The activity is a statement of the operating time, and a review of

The expression "Days to Run" is used to designate each year there is an increase in the tons per hour due to greater efficiency resulting from plant improvements.

Orders and Production

Incoming orders expressed in tons are contrasted with production to indicate the manner in which the demand is being satisfied by the supply. Chart IV gives a graphic comparison of these two sets of figures each in turn reduced to a percentage. The possible production in a week is established as 100 per cent rating and orders received and production made during a similar period are divided by the rating to give the percentage. The white area indicates orders in excess of production and the black area the reverse.

During 1936 the spread between the two was but slight until the latter part of the year. Then the unexpected development in general business caused a sharp increase in the demand for board. This outran production until April, when the recession began and orders dropped off precipitately until the end of the year, except for a small upturn in August. 1938 was much more stable with a gradual upward trend until October with production keeping in step with orders. The change in November was in conformity with the seasonal downward trend.

Days to Run

The expression "Days to Run" is used to designate the number of days, at normal capacity, that are necessary to complete orders on hand. The average boxboard mill requires a sufficient bank of orders ahead to permit economical operations of the plant. By combining orders of like grades enough tonnage may be procured to make a satisfactory run and avoid the loss incident to many changes in the production schedule. Chart V shows the days to run for each month during the past three years and the effect of the under-running or over-running of the incoming orders. During the first eight months of

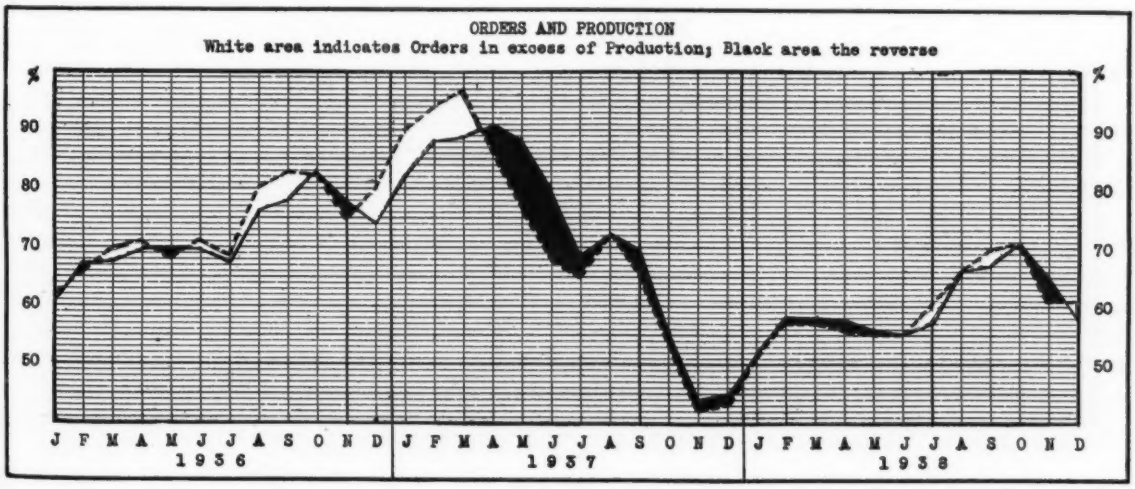

ORDERS AND PRODUCTION
White area indicates Orders in excess of Production; Black area the reverse
%
90
80
70
60
50
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1936
1937
1938

CHART IV.

1936 demand and supply were about evenly balanced. At the close of the year and until April, 1937, the strong business upturn brought in orders faster than they were produced. With the sudden downward turn, operations were not curtailed correspondingly and a loss in the bank of orders quickly followed. 1938 opened with only about one-third of the amount that was on hand in January, 1937, and remained at a low level throughout the year except for the seasonal upturn during the fall.

Production

A census of the industry is taken each year which includes all mills known to have produced paperboard. The totals for the past 10 years are as follows:

Year	Tons	Year	Tons	
1929	4,222,000	1934	3,898,300	
1930	3,906,800	1935	4,471,200	
1931	3,743,800	1936	5,247,500	
1932	3,269,400	1937	5,466,600	
1933	3,874,500	1938	4,840,000	(estimate)

The returns for 1938 are not as yet complete but a loss of about 626,000 tons or 11¼ per cent under 1937 is estimated from comparisons of identical mills representing over 88 per cent of the industry.

An analysis of past performance shows that there is an average annual growth in the industry of 151,000 tons of 3.7 per cent. Of this, boxboard gains 52,000 tons or 2.5 per cent and container boards 99,000 tons or 4.8 per cent. These are general averages exceeded in prosperous years and unattained in years of depression.

During 1937 and 1938 new capacity now in operation to the extent of 668,000 tons yearly was added to the container-board mills. At the average yearly growth of 99,000 tons it will take 6½ years to absorb this new capacity if all other factors remain unchanged. During the same period, 250,000 tons of capacity were placed in reserve which, if deducted, leave 4½ years.

The annual growth of 151,000 tons is based upon production records without relation to capacity. Each year improvements in plant and equipment increase the output per hour and add to the potential capacity. In years such as 1937 when most of the mills made profits, expenditures are large for betterments over and above ordinary replacements. The results of those improvements were felt in 1938 when the tons produced per hour were greater than in any previous years.

Price Levels and Costs

The sales prices of all grades of board were lower at the close than at the beginning of the year. The drop was most pronounced in June and July, just before the seasonal upturn. Regardless of the improved volume during the fall no betterment in prices took place and although raw material costs were lower than in 1937, the savings were much more than offset by the decline in sales prices.

The pressure of increasing capacity brought about keen competition for each new order as the new mills that were completed in 1938 came into operation. If the volume of business anticipated for 1939 actually develops, then an improvement in prices may be forthcoming with a net yearly result of profit, which was sadly lacking in 1938.

Prospects for 1939

The prospects for 1939 in the Paperboard Industry are closely tied with those for general business. Economists foresee a volume of between 10 per cent and 20 per cent above 1938 with a slowing down in the first quarter over the pace set at the close of last year, but an improvement in the Spring and a gradually better demand from then on. As previously stated, 1938 experienced a heavy fall volume which predicts a better year to follow if past history repeats itself. Developments of new use for the industry's products have not lagged. In fact, a strong effort is made in a year of declining volume such as 1938 to seek new outlets and thus utilize productive facilities otherwise idle. The full benefits of this expansion will be felt in 1939, since a new user, once converted to paperboard, seldom returns to his previous practice.

If we assume that the foreign situation will not become serious, that our government's attitude towards business will not hamper progress, and that normal profit again will become the fashion, then 1939 will mark a distinct step forward in the long overdue business recovery.

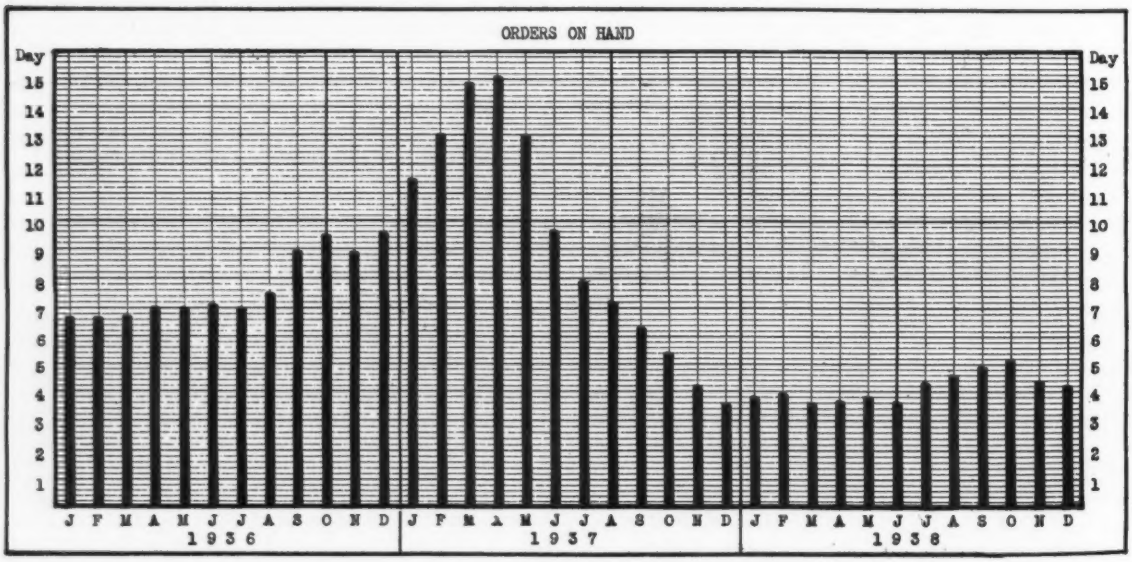


CHART V.

High Prices in Past Contributed to Make Wood Pulp Market Unstable Last Year

By O. F. Swanson, Sales Mgr., J. Andersen & Co., and the Pulp and Paper Trading Co.

The story of the 1938 wood pulp business resembles that of 1920-21, insofar as all of us, affiliated with this business, were again called upon to atone for our unpremeditated sins, and to make retribution for alleged activities to assist in the "anticipated killing" which began two years ago, or thereabouts. No particular group connected with the industry should either be given credit, or blame for what took place at that time, nor for resultant events because we were all contributing in one way or another and participated more or less willingly, buyers included, by their attractive offerings in the spree which brought about those perplexing problems of last year. According to old records, prices on wood pulp in 1920 reached record-breaking levels, and the then unprecedented rise in prices, and subsequent drop later, was primarily attributed to the unsettled monetary situation throughout the world.

This, however, was not the cause of the sharp upswing 1936 and early 1937, for which some hindsight critics claim the pulp manufacturers are solely responsible and, consequently, also for the collapse of the price structure during 1938. Be that as it may, but to my way of thinking, and I say this without fear of much contradiction, the pulp sellers regardless of their individual positions in the trade, were ably assisted during the heydays by environment to create the primary causes for the unstability of the price situation the last two years. In this connection, it should be pointed out that the domestic suppliers of chemical pulp never permitted themselves, and wisely so, to be either up in the clouds, or down at rock bottom during this last tidal wave. They concentrated on finding a happy price medium, and succeeded remarkably well in this respect.

Effect of High Prices in 1936-37

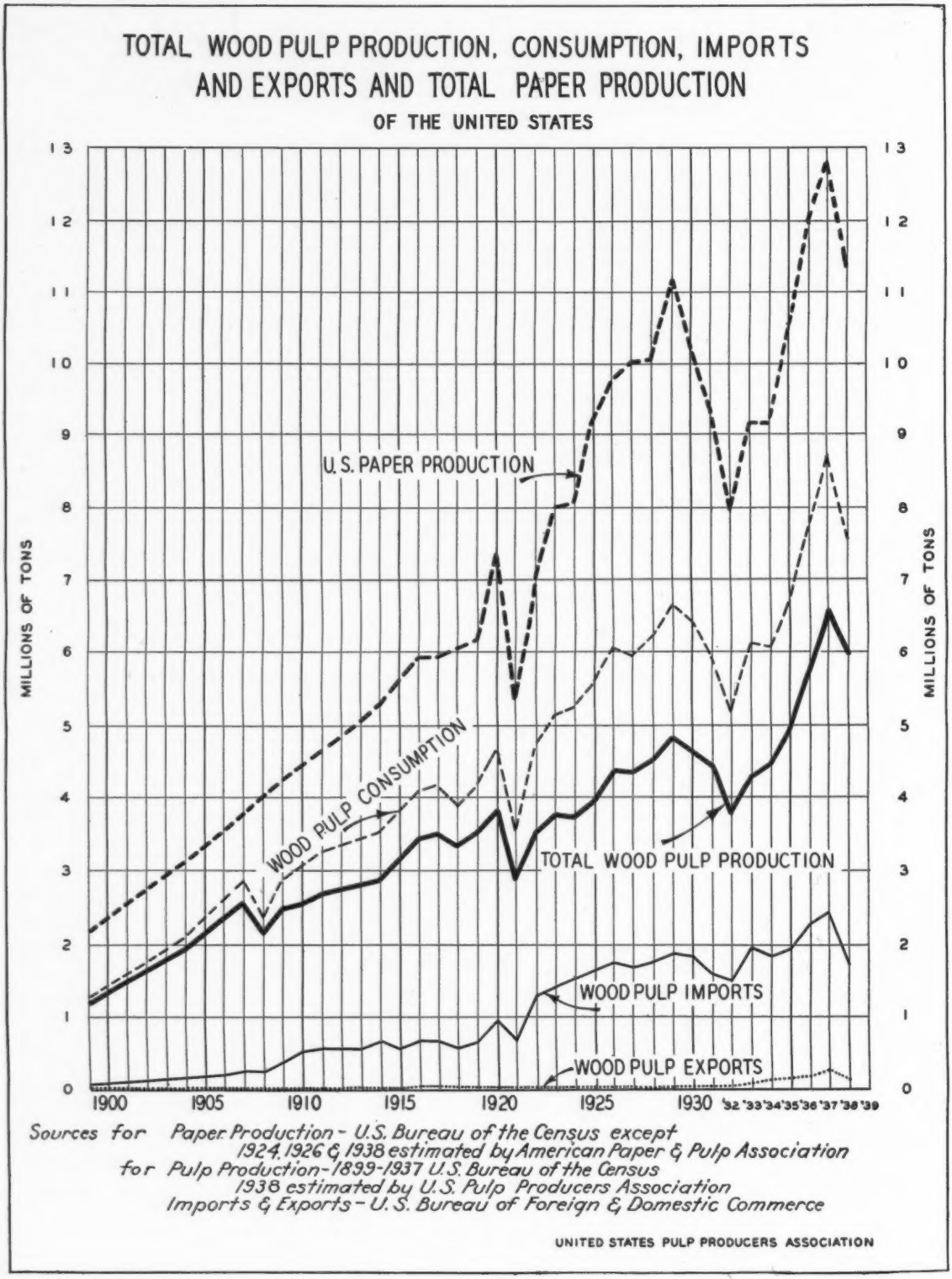
While good progress has already been made to iron out the difficulties caused by the high prices of a year and a half or more ago, it would be unreasonable to expect a perfect score from the buyers' point of view, although many sellers have taken it on the chin for some time past, in order to assist their customers to meet competition in their markets. This they have done without making any fuss about it, and are still watching this situation carefully, endeavoring to arrive at a satisfactory solution to all concerned. The dizzy height to which prices soared in 1936-37 was too great for a comfortable and dignified descent, judging from the rough going on the downward path but, at that, we have finally landed at what appears to be the bottom, fairly safe and sound, with the exception of a few painful bruises, and a little subdued feeling perhaps.

Despite the increased consumption the second half of the year, compared with the first, it had no beneficial effect, whatsoever, on prices, which continued to decrease gradually, on spot business and, contrary to expectations, the lowest point was reached at the end of the year. This, in itself, is sufficient to prove the next to chaotic condition of the price situation on imported pulp, and could also be taken as an indication that the pulp market in general has for sometime past been in a more or less topsy turvy condition. However, last year certainly did not permit "padding" of orders—definitely not—because most of the buyers' requirements were well taken care of by the effective though somewhat unpopular procedure of readjusting contracts, coupled with additional tonnage, and all at greatly reduced prices. On this account, it was almost impossible to close any strictly new business, except for lesser quantities and then, as a rule, only at bargain prices or in connection with special inducements of some sort.

Past Year Notable for Sluggish Market

While the year was marked with sluggishness, it was far from dull in more ways than one and, as a matter of fact, it probably caused more, or surely as much, unappreciated ado as any of its predecessors. The tenacity with which it carried on its tantalizing grind throughout the entire year is beyond comprehension and, under the circumstances, it would seem that the need of the hour is for fair prices to all concerned at all times. It goes without saying that they were much too high in 1936 and early in 1937 and, by the same token, too low at the moment, on all grades of chemical pulp. Until this important question has been settled, it is safe to predict that no widespread and lasting progress in the policies of selling or purchasing can be anticipated, and the range of price fluctuation on imported pulp should be reduced to that of domestic pulp.

In any event, more attention ought to be devoted to this particular and important phase of the business, if a recurrence of last year's unpleasantries is to be avoided. Apparently, nothing has been discovered to control the price fluctuation within reasonable limits, and a range of $15.00 to $20.00 per ton on prime grades of chemical pulp surely ought to be sufficient in time of peace. Not so long ago, bleached sulphite was actually sold at from $90.00 to $100.00 per short ton on dock usual Atlantic ports, and it is doubtful that the same qualities would today bring half of this price on any important tonnage basis of new business, without any strings tied to it. Prime unbleached sulphite pulp soared in the high seventies within the last two years, and the same grades are today procurable for half and less of the then obtainable prices, and the same holds true of kraft pulp. The price spread has been altogether too great for the good of the trade, and it is to be hoped that something can be devised permanently to improve this particular feature of the pulp business. Anyway, in view of the seriousness of this matter, "Now is the time for all good men to come to the aid of the party," and, after the experience of the last couple of years, and with the price question still jittery, it behooves all to whom it may concern to take heed and proceed with caution, especially for several months to come


TOTAL WOOD PULP PRODUCTION, CONSUMPTION, IMPORTS AND EXPORTS AND TOTAL PAPER PRODUCTION
OF THE UNITED STATES
MILLIONS OF TONS
MILLIONS OF TONS
0
1
2
3
4
5
6
7
8
9
10
11
12
13
U.S. PAPER PRODUCTION
WOOD PULP CONSUMPTION
TOTAL WOOD PULP PRODUCTION
WOOD PULP IMPORTS
WOOD PULP EXPORTS
1900
1905
1910
1915
1920
1925
1930
'32 '33 '34 '35 '36 '37 '38 '39
Sources for Paper Production - U.S. Bureau of the Census except
1924, 1926 & 1938 estimated by American Paper & Pulp Association
for Pulp Production - 1899-1937 U.S. Bureau of the Census
1938 estimated by U.S. Pulp Producers Association
Imports & Exports - U.S. Bureau of Foreign & Domestic Commerce
UNITED STATES PULP PRODUCERS ASSOCIATION

or at least until there is a more definite assurance of political stability throughout the world.

Progress Being Made in Readjustment

The past year has been far from lenient with anyone in the pulp business, in which respect it ran true to form, based upon past experience of numerous previous years and, on this account, we have today plenty of skeptics in the trade, many of whom are utterly confused as to what the future holds. Perhaps, another reason for this feeling of apprehension in some quarters is the conclusive demonstration of last year that even the regarded long heads, or master minds, accredited with unusual intelligence, and abundance of experience, are also far from infallible in their judgment and predictions. On the whole, however, the new year has opened with improved sentiment, and that, in itself, should have a stimulating effect, and give rise to confidence and lessen the feeling of uncertainty which persisted throughout last year. For several months past, concerted action by various sources has made every effort to meet eventualities and rightly so through the effective system of "give and take," and much good initial work has already been accomplished. This is especially true concerning revision of contracts, with re-adjustments of prices, tonnage and periods of delivery. To arrange this, utmost cooperation and the patience of Job is imperative, but whether the problems in retrospect were less difficult to solve than those in prospect is something nobody can determine at the moment.

Year 1938 Trying Period for Industry

While it is practically conceded that 1938 closed the most trying period through which the pulp business has passed for many years, there is a sizeable host of optimists who insist the worst is over. If the close cooperation between all interested parties is maintained, it is reasonable to anticipate improvement ere long, and prospects for stabilizing trade conditions on this continent are certainly much more encouraging than a year ago. Statesmen, politicians, business men, professional men and everyone else, for that matter, have for some time past displayed most vigorous and wholehearted intentions to do their bit to re-establish business in general as closely as possible to normalcy with the least possible delay. This is encouraging and their united efforts must eventually reflect favorable in all lines of business, including the woodpulp and allied industries. Nevertheless, I am of the opinion that never was cooperation and efficient teamwork more needed than at present, with emphasis on teamwork. The various trade associations and excellent trade papers in various fields of industries, are also on the fighting line, actively engaged in the struggle for better business conditions. This reminds me of the new large Lockwood's Directory, which is more comprehensive than ever, and contains much valuable information concerning pulp, board, paper mills and allied trades in the U. S. A., Canada, Mexico and Cuba and, in this connection, the somewhat condensed, soft-bound traveler's edition is certainly an asset to every traveling pulp and paper salesman.

Trend Toward Self-Sufficiency

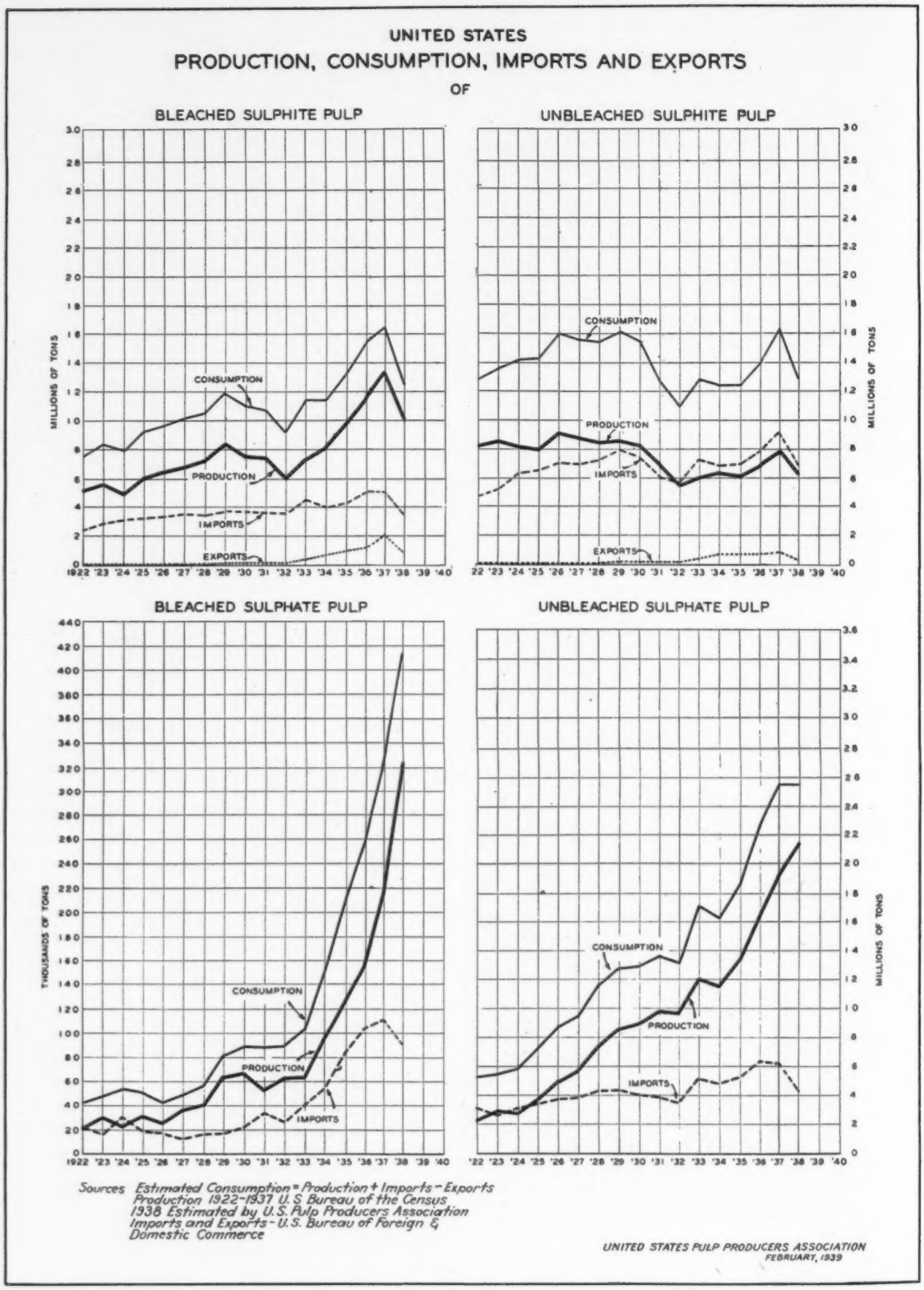
That the universal trend toward national self-sufficiency in woodpulp and especially so, with regard to kraft pulp no longer is a saga, but an established fact, should not be ignored, or even taken lightly by manufacturers of these commodities in other countries, if they intend to continue supplying old customers here with a fair portion of their requirements but to reckon on the same brisk demand for imported unbleached kraft pulp as in the past would be expecting too much. On the other hand, bleached kraft pulp in various degrees of whiteness, has grown in popularity during recent years, and is gradually displacing sulphite pulp in some instances because of its greater strength and steady improvement in quality. It is safe to predict a much better future for this pulp than for imported unbleached kraft pulp, the outlook of which is none too bright in this market, although it will be used regularly in certain sections.

Growing Importance of Bleached Kraft

Undoubtedly, there still remain some problems to be solved before bleached kraft pulp will receive the recognition which bleached sulphite has enjoyed for several decades but, as time marches on, this grade of pulp will gain in popularity for the reasons mentioned, and also because of the increasing tendency in the paper trade to favor strong, clean, white pulp. The complex problems of papermaking have been considerably simplified by technical advances and the use of modern control instruments and improved equipment, starting with the laboratories and throughout the mills. This, naturally, has had its effect on pulpmaking, which is trying to follow suit, as well as on the other raw materials. Not so long ago, the impression prevailed that any experienced man could make good paper from good pulp, but that it would take a good man to do so with pulp not so good. However, in these days of keen competition, this idea had to be discarded, because there is very little room or time for haphazard manufacturing, nor for much experimentation outside the laboratories.

Progress Made by Pulp Manufacturers

With the advent of high speed paper machines, and their efficient and good operation, uniformity in quality and good strength of the pulp is indispensable. The pulp mills have consequently also made progress in many ways, and never has better chemical pulp been made than at the present. If any pulpmaker, for some reason or other, fails to recognize this rather important development in papermaking, the demand for his pulp is bound to suffer, except in cases where price is the main object, and these are becoming less numerous. Strength, cleanness and uniformity are the most essential rquisites in all grades of pulp and, although bleached sulphite of high white color is still very desirable, the various and comparatively recent developments in dyes and other agents for improving the color and to increase the opacity of the paper have minimized the importance of this feature, and the original whiteness of this pulp is no longer regarded a serious detriment except possibly in rare cases. However, any pulp in the sulphite group with unusual high color, together with the other three characteristics would undoubtedly be given the preference by the users but as such bleached pulp is difficult to produce without additional cost, this would probably interfere with its disposal on an equally profitable basis at which other grades of slightly lower color can be marketed. As already slightly referred to the requisite tests for establishing the proper and acceptable color of the paper are nowadays facilitated by the use of various pigments and they are therefore perhaps less dependent upon the basic degree of whiteness of the pulp than formerly.


UNITED STATES
PRODUCTION, CONSUMPTION, IMPORTS AND EXPORTS
OF
BLEACHED SULPHITE PULP
UNBLEACHED SULPHITE PULP
BLEACHED SULPHATE PULP
UNBLEACHED SULPHATE PULP
MILLIONS OF TONS
THOUSANDS OF TONS
CONSUMPTION
PRODUCTION
IMPORTS
EXPORTS
1922 '23 '24 '25 '26 '27 '28 '29 '30 '31 '32 '33 '34 '35 '36 '37 '38 '39 '40
Sources Estimated Consumption = Production + Imports - Exports
Production 1922-1937 U.S. Bureau of the Census
1938 Estimated by U.S. Pulp Producers Association
Imports and Exports - U.S. Bureau of Foreign & Domestic Commerce
UNITED STATES PULP PRODUCERS ASSOCIATION
FEBRUARY, 1939

Congested Shipments Create Difficulties

For several years past, ports on the Great Lakes have received large cargoes of both domestic and imported pulp, and last year was no exception in this respect. Available figures indicate that in the aggregate deliveries in excess of two hundred thousand tons were made to these ports in 1938 and although this is a drop of about 25% in 5 years, this diverted tonnage no doubt ameliorated the congested conditions at Atlantic ports, some of which declared their inability to store further cargoes. Albany also announced that it was in the same predicament. At the time of writing, this situation has not altered greatly, and is still a disturbing factor to both sellers and buyers. Hence, it is to be hoped that suppliers abroad do not anticipate shipments against contracts as, by so doing, they would aggravate the situation and, perhaps, incur heavy additional expense. As it is likely that shipping points abroad are in similar straits, some unforeseen difficulties are apt to result from this source, regardless of whether anticipated shipments are resorted to, or the tonnage kept where it is until storage facilities on this side have improved. Of the two evils, the second will probably prove the least difficult to handle, unless arrangements can be made with the ultimate consumers to accept immediate deliveries upon arrival of cargoes at ports.

Decline in Imports and Consumption

Contrary to several previous years, both imports and consumption of pulp decreased considerably last year, about which detailed information will be given elsewhere in this publication. The delivered cost of pulp from the various producing regions is fairly accurately arrived at by adding transportation charges to the cost of manufacture. Obviously, the lowest delivered price on pulp in any region is apt to govern the price structure there, and sellers with higher freight rates, must necessarily make corresponding allowances to obtain their share of the business. In bleached sulphite pulp, the Pacific Coast appears to have the advantage over other regions, both with regard to actual cost and quality for general use, although individual pulp mills in other territories probably make equally as good, or even better qualities but, undoubtedly, at higher costs.

The Sulphate industry of the South has attained a commanding position in this field and, while the tonnage of southern pulp allocated for sale to the so-called converting mills in the future might not be as large as expected some time ago, the southern competition is exerting great influence in this branch of the industry, not only by its tremendous tonnage of finished products, but also in a lesser degree with the aid of its sales of pulp. Insofar as wood costs can possibly dominate the cost of pulp, the southland probably rules supreme. We all, I think, have a pretty good idea of its importance in the kraft market and it won't be long now before a considerable tonnage of Southern newsprint will be added to the already large paper and pulp production of the South. Its further possibilities are today impossible to visualize, but it is safe to predict that the saturation point is still at a considerable distance. The diligent and persistent research work in wood chemistry and fiber purification is bound to bring about new developments in southern wood.

Stability of Mechanical and Soda Pulps

Aside from the large tonnage of both mechanical and chemical wood pulp manufactured in this country, some of which was exported for rayon and other purposes, our old standbys Canada, Sweden, Finland, Norway and other countries supplied their usual and well known brands of chemical and mechanical pulp and, as previously, Sweden was by far the largest exporter of chemical woodpulp. For some unaccountable reason, prices on mechanical woodpulp varied less than those quoted on any other kind of pulp, and this is significant because in spite of the decreased demand, prices remained on a fairly level basis. Next in the rank is domestic bleached soda pulp, on which the price fluctuation was remarkably low, compared with other grades of chemical pulp.

New Trade Pacts Significant

The recent trade agreements concluded between the United States and Canada, and between the United Stats and Great Britain give the trade relations in woodpulp between these countries special significance. Trade between Canada and the United States in woodpulp was a lopsided proposition in favor of Canada before the conclusion of this new trade treaty but, with the removal of trade barriers all around on this commodity, this situation has been adjusted in line with reciprocal trade agreements and the policy of our Federal government towards good neighbors.

That there should be some loss to Canadian pulp manufacturers by the abolition of the duty on imported woodpulp is obvious, if their market is offering the same opportunities to exporters accorded them in this country. Only time will tell how trade will shift under any new pact but if Canada cannot look out for her own interests of the woodpulp trade in her own home market no other country similarly blessed can look out for hers. To export woodpulp to our good northern neighbor would be about as profitable as to try this on Sweden, Norway or Finland. Anyway, this is one man's opinion. When in doubt, some folks turn to astrology for guidance, hoping to find some twinkling star to kindly enlighten them and hence, I choose mine in the former pulp and papermaker, Robert Benchley, who, believe it or not (Ripley) was the first graduate from our honorable industry to become an author, movie actor and radio broadcaster, etc., and asked him for his opinion concerning the future of the pulp and paper business. Being of the alert type of individual, he replied unhesitatingly, "if we all keep on plugging, and do less fretting, the future is bound to be brighter, regardless of our vocation in life"; and he then added, rather philosophically, "why don't we all try to profit by the teachings in the favorite motto of a good old King of Yore: 'O Lord, help us to win but, if we cannot win, teach us to be good losers; Teach us, too, neither to cry for the moon, nor over spilt milk'."

Argentina Exports Less Casein

Exports of casein from Argentina during 1938 were less than for each of the past 15 years, while shipments of this product to the United States were the lowest recorded for any year during the past 25 years, according to a report to the Department of Commerce from the office of the American Commercial Attache at Buenos Aires.

The limited foreign demand has been reflected in the low level of prices prevailing over the past eight months, while the large stocks on hand have continued to increase.

Kraft Paper Producers Experienced Difficult Year But Output Fell Only 4 Per Cent

By S. M. Hudson, Secretary Kraft Paper Association

A year ago in reviewing 1937 we termed it one of the most unusual years in the history of the kraft paper industry. We have now completed another year, 1938, and it, too, must be called unusual although its characteristics differed greatly from those of the preceding year. 1937 was a year of declining volume, starting with capacity operations in the early months and ending with operations at about 40 per cent. 1938 reversed this trend and started with an extremely inactive market with demand increasing gradually during the first half of the year, and building up to a fairly satisfactory level in the latter months. Superimposing a chart showing the 1938 weekly trend of orders upon a similar chart for 1937, reveals an unusual "x" formation with the 1938 weekly trend line rising to cross above the declining 1937 line at about the middle of the year. It is quite apparent from such a chart that the demand for kraft paper over the two-year period, 1937-1938, was so influenced by the general economic trend of all business that normal seasonal characteristics were practically eliminated.

Progressive Growth in Demand

A study of the major economic movements within the United States quickly reveals how comparatively fortunate the kraft paper industry has been during recent years due to the progressive growth in demand for its product. The shipments of kraft paper in 1937 established a new tonnage record for the industry and were about 30 per cent greater than in 1929. The tonnage for 1938 was only 4 per cent less than 1937 and was greater than any year prior to 1937. By comparison, the Federal Reserve Board index for all industrial production shows 1937 to have been only 92 per cent of 1929 and 1938 was 21 per cent less than 1937.

Further analysis of the figures indicates that the 1937 business depression really started with a slight reduction in general business activity in March, 1937. The demand for kraft paper, however, did not show any downturn until May at which time there still was an abnormal supply of unfilled orders which permitted almost capacity operations through August. This latest depression in general business did not reach its low until March, 1938, whereas the kraft paper industry touched its low in December, 1937 and recorded slight successive increases during January, February, and March, 1938.

Competition Forced Prices Down

In spite of these comparisons, which indicate the relatively fortunate position of the kraft paper industry in regard to volume for 1938, that year was not a happy year for the kraft paper manufacturers. To the contrary, 1938 was one of the most disastrous years in the recent history of the industry. Starting the year with a practically stagnant market and with only slight increases in demand during the spring months, the average operating activity for the first half of the year was less than 65 per cent. Operating at such a low rate occasioned many serious problems including excessive production costs. Starting about mid-year there was a more active market with volume for the last half of the year averaging about 25 per cent greater than in the first half. During this same period, however, there developed a wild competitive scramble for business among the kraft paper manufacturers which carried prices down to a wholly inadequate level.

The sharp recession in demand in late 1937 was most inopportune for the kraft paper industry. Unfortunately, the market demand contracted just at the time when the producing capacity of the industry was being expanded by the completion of new kraft mills which had been under construction for many months. The material excess in producing capacity over curtailed consuming demand was the chief contributing factor to the difficulties experienced by the kraft paper industry in 1938.

Balancing Capacity with Demand

The task of maintaining proper relationship between producing capacity and market demand has been a serious problem for many years. The kraft paper industry is still a comparatively young industry with a progressively expanding market for its product. With increasing demand it has been necessary to construct additional producing facilities from time to time. Unfortunately, the expansion in producing capacity has not been handled in an orderly manner. As a result, the history of the industry reflects a frequently recurring cycle of events arising from the lack of balance between capacity and market demand. New construction has taken place spasmodically rather than regularly coinciding with the growth in demand and each time the expansion in capacity has been greatly in excess of immediate needs. Upon the completion of each period of construction there has developed a competitive struggle for business among manufacturers with each unsuccessfully striving to secure sufficient volume to make possible a reasonable rate of operation. The result always has been the same—demoralization of the market and a decline of prices to an unprofitable level.

Consumption Overtakes Production

During the early '30's the kraft industry found itself in this position and for several years the industry suffered devastating losses and was threatened with bankruptcy. Gradually market demand increased until by the end of 1936 the consuming demand was in excess of producing capacity. During the latter part of 1936 and early 1937, the industry found itself unable to make prompt shipments or to service its trade properly. Some expansion in capacity should have been made prior to that time but financial reserves of the mills, depleted by operating losses, had been inadequate to finance new construction. Fur-

thermore, the unsatisfactory financial record of the industry had made it an unattractive field for new capital. Having too long delayed expansion, additional capacity was recognized as imperative in 1936 and, accordingly, a splurge of new construction was undertaken. Due to the extended time required to build a kraft paper mill, however, the new capacity was not available until late in 1937. When these new mills finally came into production the market demand had receded and there again existed an over-expanded capacity.

Thus, 1938 was a year in which the industry had to struggle not only with greatly reduced volume in the early months but also with problems resulting from over-expansion of capacity. It was a most discouraging year for the kraft paper manufacturers. As the year ended, however, it was evident that the manufacturers had made definite progress in adjusting themselves to these problems.

Outlook for 1939 Favorable

The kraft paper industry is essentially a healthy industry offering a constantly improved product in an expanding market. In the past ten years the annual domestic consumption of kraft paper has increased from about 800,000 tons to almost 1,200,000 tons. The industry, however, has suffered from growing pains which were particularly severe in 1938. The outlook for 1939 is favorable. The industry undoubtedly has passed through its heaviest period of new construction and future expansion probably will be limited. The industry has absorbed the shock of new capacities and the new mills, new machines, and new individuals, which have recently come into the industry, have pretty well found their place with the industry adjusting itself to them.

The manufacturers of kraft paper are optimistic as to the future. In view of the forecast for improved general business in 1939 we hope for an increase of about 10 per cent in the kraft paper volume. We believe that our industry has made marked strides in recovery from the chaotic conditions of last year and with the anticipated increase in volume and improved price levels, we expect to return to a condition where our mills will have a reasonable operating rate; where our employees will be given more regular work, and where we can earn a fair return on our stockholders' investment.

Adequate Supply and Declining Mill Demand For Paper Stock Creates Dull Year

By Walter R. Hicks, Jr., of Daniel M. Hicks, Inc.

Nineteen hundred and thirty-eight was the best year in history!—for life insurance policy holders. That is to say, their health was the best ever, and the death rate dropped to an all time low. If the picture presented by the paper manufacturing supply line was reflected by industry in general, I think I know why. Nothing happened to dispose anyone for the "Great Adventure." When you sit and stare out a window, watching the Fords go by, you're not apt to catch anything except perhaps a pain in the neck. With nothing going up and not much coming down, except the Men from Mars, that memorable Sunday evening in October, there was really nothing to worry about. When you have nothing to worry or get excited about, you just eat and sleep and lead placid, uneventful and unprofitable lives.

You readers with enough intestinal fortitude to read a market review for such a year, than whom there are no braver, save one courageous or foolhardy enough to try to fill a page with such material, know that 1938 was hardly productive of anything startling in the way of price rise or fall, in any grade whatsoever. Paper making material prices couldn't go any lower and they just wouldn't go any higher.

Effect of Supply and Demand on Paper Stocks

Why was '38 such a dull year? In the writer's opinion (and one fellow's opinion is as good as the next one's these days) supply and demand are still the controlling factors influencing a market. Supply and demand walked or crept so evenly abreast that there was no need, occasion or actual practical justification for appreciable upward trends in prices of raw materials from the February lows. And that applies also to grades such as Roofing, Books, Mixed Papers and News, where the buying factors are conceded to have the means to influence prices, and have been assailed for keeping them at levels far lower than their own production rates or the economic well-being of their suppliers would seem to warrant. $3 Mixed Papers and $5 to 6 News will be available just as long as the present demand meets with a compatible supply. When such prices fail to entice enough tonnage to meet demand, then and then only will prices advance.

Board and roofing mill production rates were at good levels through most of the year; high inventories in roofing mill hands enabled them to purchase at any time during the year at no higher than $19.00 delivered for No. 2's. When occasionally demand was stiffening and available outside supply had apparently all been absorbed, they were still in a position to discourage price advances by drawing on their own inventories. No. 1 classification brought no higher than $23.00 delivered and for the bulk of the year fluctuated in the small range of $5.00 below up to this figure. It is difficult to ascertain what tonnage has been sold at $20.00 to $23.00 of foreign Dark Cottons which has netted the importer any kind of a profit. For $23.00 dock was the highest price known to have been granted and foreign quotations were scarcely abundant that would permit of any margin at this price. Japanese roofing was out in the East, quotations ranging upward from $25.00 and starting at $1.50 on Linseys.

Price Trend of Waste Paper

As previously mentioned, board mills operated well

—but got no price for the finished product. Except for the ridiculously low price of $1.50 per ton ex packers door in February for ordinary mixed papers, all needed supplies have been available, and have moved steadily, if forlornly and woefully at prices which average about $2.50 for the year. August brought a $3.50 price and at time of writing the grade moves steadily at $2.50 to $3.00 f.o.b. New York. Chicago prices were more reasonable at $4 to $6.00.

Folded news were bogged at $3.00 per ton at the first of the year but moved quickly to $5.50 and ranged thereafter from $4.00 in April to $6.50 for a short time in August and at the year end were bringing $5 to $6.00. Chicago prices were always a dollar, or two at times, better than those in the East.

Corrugated moved steadily throughout the year at an average f.o.b. New York price of about $6.00; 27½ cents in January up to 32½ cents per 100 in February, down to $4.00 a ton in May and gradually upward to $7.00 in November. December slackening contributed to the grade closing for the year at $6.00.

Books were in a deplorable state at the outset of year at least from the packers' viewpoint as far as price was concerned and at the close and currently are a headache to the consumer at well—or will be. The increasing use of excellent coated groundwood sheets at least occasionally and in amounts up to an entire form in practically all the heavy magazines has resulted in terrific difficulty in sorting, it being practically impossible to detect most of the objectionable stock. Something is coming, either a substantially increased return for the packer enabling him to properly sort, or a collapse of the pretense of grading and the shift of responsibility to the mills. From $10.00 f.o.b. New York in January up to $18.00 delivered in August, at which point considerable tonnage came around from the West Coast, down to $16.00 delivered in December—that was the "book picture" with a "picture book" contributing largely to the increasing quality problem.

Old kraft grades were spotty in demand. Worthy of note was the practise around midyear of sorting kraft corrugated out of No. 1 kraft—and shipping the corrugated—it was actually in better demand and brought as high as 85 cents per hundred in May. Soft kraft moved through a range of $10 to $17.00 for New York—"opening" at 70 cents and closing at 75 cents. Kraft envelope averaged out around $1.50 and kraft corrugated cuttings about $20 to $23.00.

In the fall, white news blanks were in strong demand and brought as high as $28.00 f.o.b. New York. White ledged was one grade which held its own very well throughout the year, weakening only at the very end. We speak of a grade holding its own in a comparative sense only. At any rate, from $22.00 f.o.b. New York it moved up to $1.50 in January and down through $1.10 in the Spring, up again to $1.50 in August. They closed at $24.00 and are currently purchasable in fair quantity at $1.10 to $1.15 f.o.b. New York. Ordinary soft white shavings moved around $30 to $35.00 with the "one cut" variety bringing as high as $2.25 and never far below $40.00. When other grades were in shameful positions, Hard White Envelope Cuttings was the one healthy number. As high as $53.00 New York was realized for good packings. It wasn't until late December that demand became sluggish and supply more plentiful than it had been resulting in direct mill purchases as low as $45.00. Hard white shavings maintained a fairly regular $5.00 margin under Envelope.

Market Trend in New and Old Rags

New cuttings for the "fine mills" were never out of control and there was no noteworthy fluctuation in any grade. Levels in January of $7.50 on White shirts 6 cents on light flannelettes, overalls at $5.75 and unbleached at $7.25 all delivered mills were never exceeded and all these "key grades" closed $10 to $15.00 per ton lower. At no point did foreign demand for shirt cuttings, the only grade to move steadily to Europe, seriously alarm mill consumers and only once, in October, did mill demand at $7.50, prevent sales abroad. It can safely be said that neither outlet caused any amount of embarrassment to the other. The fall scarcity found Europe satisfied with tonnage and the dearth was too short lived to elicit anything handsome in the way of price from domestic users.

Colored rags were a drug on what little market there was. No demand from abroad, none here and terrific accumulations in graders' hands. No movement and price meant nothing. The only thing in manila rope worthy of note was the peculiar position of foreign in September being quoted at $2.65 with domestic at $2.50. Demand for both was spotty and prices fluctuated within a small range from $2.40 to $2.90 on imported and $2.50 to $3.00 on domestic. Generally a 25 to 50 cent differential prevailed.

Gunny bagging was just as unexciting, $1.65 to $2.00 was the range on domestic and consumers paid as high at $2.40 for foreign at one point in July.

Consumers wanted jute strings pretty badly at the close of the year offering as much as 2 cents f.o.b. shipping point, with none available. Sisal strings were around $1.50 most of the time with little fluctuation above or below this figure.

If any other uninteresting things have been overlooked—I'm sure you really won't be upset about it. Where are we now, as compared with this time last year? Well—there's no Austria and very little Czechoslovakia—that's different. The Yankees still reign supreme—that's the same. Congress said "No" the other day—that's different—we're all still anxious to turn an honest dollar—even if only to see if it's good—that's the same and about the only encouraging thing in the paper business is that the mills are waking up to the need of getting more money for their finshed products—and their raw material inventories are down, if not out.—"Old Glory" is nearer and dearer to the hearts of all this year and last,—and that's something—and I guess if the price of mixed is all we have to worry about this year, we'll be pretty well off. And I hope we don't even have to worry about that—so help me.

Italy Produces More Pulp

Production of chemical pulp in Italy during the first 9 months of 1938 amounted to 3,025 metric tons as against 2,727 tons during the corresponding 9 months in 1937, according to reports made by the four identical mills to the Ministry of Corporations. These amounts represent pulp for sale, and do not include pulp manufactured for immediate consumption by paper mills or textile factories. Italian aims in the field of chemical pulp are already half realized, according to an eminent authority, and 150,000 tons of pulp for paper production and 60,000 tons for textile production will be produced annually before 1942. A goal of 400,000 tons per year is set for Italian producers.

Canadian Newsprint Producers Experienced Poor Year With Sharp Drop in Output

By C. L. Sibley, Regular Correspondent of the Paper Trade Journal

Newsprint producers in Canada in 1938 experienced a difficult and disappointing year, due to a combination of unfortunate circumstances—first, the fact that American publishers had laid in large stocks of surplus newsprint in the previous year in anticipation of a rise in price; secondly, the recession in general business in the United States, which drastically affected the consumption of newsprint; and thirdly, the war conditions in Asia and Europe, which seriously affected consumption in overseas markets. The result was a decline in production as compared with the previous year of 1,043,220 tons and a decline in shipments of 1,138,673 tons. As against this one notable advance was achieved, which was that the old tradition in regard to the general price level was broken, namely that the prevailing price of all the mills should be set by the lowest contract price quoted by any one mill. That the leading producers maintained an unbroken front in this connection, and preferred to lose tonnage rather than to attempt to steal each other's business by quoting at lower than the $50 level which had been announced beforehand, speaks much for the self-discipline and morale of the operators, who had seen ruin brought to the industry by the cut-throat competition which attended the last depression, and realized that the chaos which then prevailed would inevitably be repeated if a policy of "devil take the hindmost" were followed again.

Higher Price Partly Offsets Lower Shipments

The net result of the year is not as bad as the sharp decrease in shipments would make it appear, for the price obtained was $7.50 per ton higher than in 1937. It is true that this was to a considerable measure offset by increased costs, and that the earnings of the mills were decidedly inadequate, but in view of the fact that all the companies are now working under capital reorganization, and that the general morale has proved so high in such a period of severe testing as the past year, conditions in the industry are considered to be fundamentally healthy, and optimism in regard to the future justified. While during the year surplus stocks in publishers' hands were not brought down to normal, as had been hoped, reports indicate that progress has been made in this direction, and once elimination of surplus stocks beyond normal has been achieved the outlook should be decidedly improved. The extent to which this surplus interfered with 1938 sales is indicated by a statement of Charles Vining, president of the Newsprint Association of Canada, in which he estimates that it probably accounted for 750,000 tons of the decrease in 1938 shipments.

Monthly Production and Shipments

The following table giving the monthly production and shipment figures for 1938, as compared with those for the previous year, indicates the course of the newsprint industry in Canada for the past year:

	Production, Tons, 1938	Per cent down from 1937	Total Shipments, 1938	Per cent down from 1937
Jan.	222,500	23.2	168,960	33.4
Feb.	202,601	26.7	162,906	30.2
Mar.	224,604	25.7	182,687	37.0
Apr.	200,794	32.3	214,182	30.5
May	207,678	33.1	193,288	36.5
June	201,694	35.4	208,476	31.3
July	202,546	35.9	205,490	30.0
Aug.	220,303	31.1	204,688	37.3
Sept.	231,940	25.7	230,346	23.4
Oct.	254,872	19.2	255,100	24.6
Nov.	245,295	19.0	264,421	26.0
Dec.	209,753	28.5	225,472	34.7
Totals	2,624,580		2,515,996	

It will be seen that the year started with a relatively enormous decrease in shipments, and that this continued until the end of August. Then a marked pick-up in sales is reflected for a period of three months, but the year ended with December as bad in comparison with the previous year as January had been. This is believed to be a direct reflection of the general unsettlement of business caused by the critical situation in Europe.

The Question of Price

On the subject of the price advance registered for 1938, a statement given to the papers by Mr. Vining, of the Newsprint Association of Canada, says: "Prices in 1938 were based on $50 per ton, delivered at New York, compared with $42.50 per ton in 1937. The 1938 prices were the best obtained by Canadian mills since 1932, but they were still $12 per ton lower than in 1930 and remained considerably under the general index of United States commodity prices throughout 1938. Some decrease in sales of Canadian newsprint was due to the fact that Canadian producers in 1938 chose to maintain their price levels in all major world markets rather than engage in following lower prices of European and American producers as they have done in previous depression periods. This was a relatively small factor in the Canadian tonnage loss, but might become a larger factor with continuance of price differentials. In the United States market throughout 1938 European producers offered tonnage at $7 a ton below the Canadian price, and the majority of the United States mills sold at $2 under the Canadian mills. The European differential has been a common practice, but the differential between the prices of Canadian and U. S. mills marked the first time in years that Canadian sellers have not been bound by interlocking contracts to follow any price named by a major U. S. producer. In overseas markets Canadian sellers also maintained their price levels, preferring to lose tonnage rather than become involved with foreign producers in destructive price-cutting such as brought the debacle of a few years ago. In the South American market, German methods of competition became an influence, and European prices in this market during 1938 dropped to a point approaching former depression levels."

Increase in Newsprint Mill Capacity

The total rated capacity of Canadian newsprint mills in 1938 was 4,204,300 tons, a fairly substantial advance over the capacity in the previous year. For the current year an increase is estimated over the 1938 capacity of 103,000 tons, or approximately 2.4 per cent, resulting from a combination of the full-year operation of the new Comeau Bay mill—this mill did not start operating at peak for a part of 1938, as it came into production slowly at first—and certain minor improvements in the productive efficiency of existing machines. It is interesting to note, however, that in 1939, due to the fact that this year will have 53 Sundays, something which occurs but once in fourteen years, the number of working days will be 308, against 309 in 1938, and hence the effective capacity for the year will be 4,293,400 tons, instead of 4,307,300. The rated capacity per day for 1939 is 13,940 tons, against 13,606 in 1938.

Innovations in Newsprint Production

The most notable advance, not only in actual production, but in methods of production, in the newsprint field in Canada during the year, was undoubtedly that effected by the new mill at Comeau Bay, established by the Ontario Paper Company for the production of newsprint for the New York Daily News. This mill, which is the centre of a $25,000,000 newsprint, water-power and model town project on the Lower St. Lawrence some 400 miles east of Montreal, is designed for the production of 120,000 tons of newsprint per year. It came into production in January, 1938. In connection with it are leased timber limits that are among the best in the province, extending over an area of 2,553 square miles. Many innovations in the design of the plant and machinery were introduced, some of them of a revolutionary character. In the groundwood mill hydraulic magazine grinders were installed that operate at a slower than normal speed but with higher powered engines. A closed white water system was introduced, using filters with double valves separating the very clear white water and making it available for use in the paper machine showers. These changes resulted in high quality groundwood, economically produced.

To the sulphite mill the engineers granted a smaller part than usual, the entire mill being designed to operate at low sulphite percentages in order to provide economic production and at the same time produce paper with a higher proportion of fine groundwood fibre, leading to a finer and more absorbent surface. One important change introduced into the sulphite mill was digesters with a very sharp bottom cone, to avoid difficulties in blowing and provide a more uniform pulp. The results, when the mill went into production, were surprisingly low steam and sulphur consumption.

The first decision in connection with the paper machines was to use wide machines. As experience in other mills had shown that the mechanical stability of wide machines left much to be desired, departures in design were worked out. The weights and diameters of the various rolls were increased. To meet the second common difficulty, of maintaining proper moisture content of the paper, the engineers designed an entirely different kind of hood. Paper machine ventilation equipment was secured and on each machine hoods and exhaust ducts of asbestos board lead to five units of Briner economizers. With this system moisture-laden vapor is withdrawn from the hood more uniformly and with the use of very much less air.

A third problem, encountered wherever wide machines are in use, was concerned with the calender stacks. All wide calender stacks previously in use were too heavy, and the excessive weight caused consistent trouble. To solve this problem the engineers called for the largest diameter bottom calendar rolls ever made, rolls 40 inches in diameter and weighing 51 tons each. All other rolls in the stack are hollow and weigh no more per inch of nip than do rolls on stacks only 232 inches wide.

To make high speed operation possible with very low sulphite content, it was necessary to provide a very large water removal capacity in the wet ends and to arrange for high head-box temperatures. The wet ends were therefore equipped with 100-foot wire, very large table rolls, splash guards, forming tables, an adjustable pitch to the wire, a double box in the couch, weight suction boxes and exceptionally large vacuum pumps.

First Among Manufacturing Industries

With the spectacular rise of the mining and allied industries in Canada in recent years, the pulp and paper industry now comes second to the non-ferrous smelting and refining group with respect to gross production, but it still ranks first among Canadian manufacturing industries in capital, employment, wage and salary distribution, and net value of production. The pulp and paper industry has headed the lists in net value of production since 1920, and in wage and salary distribution since 1922, replacing sawmills in both cases. It was first in gross value of production from 1925, and held that position for a decade, when it was overtaken by the non-ferrous group. In these comparisons only the manufacturing stages of the pulp and paper industry are considered, no allowance being made for the capital invested, employment furnished, payroll, or production of those operations in the woods which form such an essential part of the industry as a whole.

The gross value of output of the industry increased rapidly and steadily until the boom years following the Great War, when it jumped to a peak of over $232,000,000 in 1920. This was followed, in 1921, by a drop which was general throughout the industrial field. From that year on there was a steady recovery, resulting in a total for 1929 of $243,970,761, followed by successive decreases to $123,415,492 in 1933. The large decreases in these four years were due both to lower price levels and diminished production; however, for 1933 production was substantially greater than for the previous year, although the total value was nearly 10 per cent less. In 1934, 1935, 1936 and 1937 quantity and value of production both increased. The gross value of production increased by 22.2 per cent in 1937, when it reached a total of $226,255,915. Returns for 1938 have not yet been compiled, but preliminary figures show that there was again a substantial recession.

Three Classes of Mills

There are three classes of mills in the industry. These, at the beginning of 1938, comprised 27 mills making pulp only, 47 combined pulp and paper mills, and 24 mills making paper only. In 1937 the 74

mills making pulp produced 5,141,504 tons, valued at $116,729,228, representing an increase of 14.6 per cent in quantity and of 26.4 per cent in value over 1936; over 79 per cent by quantity was made in combined mills and used by them in paper making. About 4 per cent was made for sale in Canada and 17 per cent was made for export. Of the total pulp production in Canada in 1937, 64 per cent was ground wood, 18 per cent unbleached sulphite, 9 per cent bleached sulphite, 6 per cent sulphate, and the remaining 3 per cent screenings, etc.

The total production of paper in 1937 was 4,345,361 tons, which was valued at $175,885,423. Newsprint and similar paper made up 3,673,886 tons, or 84 per cent of the total; paper boards made up 10 per cent, wrapping paper 2 per cent, book and writing paper 2 per cent, and tissue and miscellaneous papers the remainder. In the past few years there has been a tendency in Canadian paper mills toward the further conversion of many of these basic papers and boards into more highly manufactured products such as napkins, towels, packaged toilet papers, coated and treated papers, envelopes, stationery, and other cut paper and boards.

The 1937 production of newsprint marked an all-time record for Canada. The 1936 production had exceeded, by about 500,000 tons, the previous peak of 2,725,331 tons produced in 1929, but the 1937 production increased by another 448,000 tons, and was 34.8 per cent greater than that of 1929, although the value was still $24,000,000, or 16 per cent, lower than in that year. The Canadian production of standard newsprint was three and three-quarter times that of the United States during 1937, and formed 73.7 per cent of the total North American production of 4,943,000 tons. The world production of newsprint in 1937 was estimated at about 8,971,000 tons, to which Canada contributed over two-fifths or 40.6 per cent. Canada produced three and a half times as much as her nearest competitor, Great Britain, which contributed 11.5 per cent of the total. The United States produced 10.5 per cent of the world total, Germany 5.8 per cent, Finland 5.1 per cent, France 4.7 per cent, Japan 4.6 per cent, Newfoundland 3.9 per cent, and lesser amounts from other countries.

Increases were shown in 1937 in the production of other papers as well as in newsprint. The production of book and writing and other fine papers rose 12.3 per cent in quantity and 16.1 per cent in value; the tonnage of wrapping paper increased 13.4 per cent with an increase of 16.9 per cent in value; tissue paper production rose 27.3 per cent, boards 16.2 per cent, and other basic paper 12.1 per cent.

At the beginning of 1938 the total capital invested in the manufacturing part of the industry was $570,352,287, an increase of 5.7 per cent over the previous year, counting only capital invested in operating mills. The total employment on salaries and wages in pulp and paper mills in 1937 was 32,101, as compared with 30,054 in the previous year, and the salaries and wages amounted to $48,757,795, as compared with $40,063,852, an increase in employment of 6.8 per cent and in payroll of 21.7 per cent.

The importance of the industry in maintaining Canada's position in respect to foreign exchange is shown by the fact that it contributed over 57 per cent of the excess of exports over imports amounting to $316,063,687 realized by Canada during the calendar year 1937. The actual contribution of the industry as a whole, in 1937, to this trade balance was approximately $181,278,079, being made up of the difference between the value of pulp and paper exports and imports. From the point of view of sustaining trade balances, Canada's experience has been that products of forest origin have always been more dependable than any other comparable group of commodities.

Record of Paper Production

The production and value of the products of Canadian paper mills from 1928 to 1937 inclusive are as follow:

	Quantity	
Year	Newsprint, Tons	Other paper, Tons
1928	2,414,393	434,806
1929	2,725,331	471,818
1930	2,497,952	428,835
1931	2,227,052	384,173
1932	1,919,205	371,562
1933	2,021,965	397,455
1934	2,604,973	464,543
1935	2,765,444	515,452
1936	3,225,386	581,943
1937	3,673,886	671,475

	Value	
	Newsprint	Other paper
1928	$144,146,632	$40,158,773
1929	150,800,157	42,189,095
1930	136,181,883	37,123,991
1931	114,419,637	32,210,252
1932	85,539,852	28,333,271
1933	66,959,501	29,730,374
1934	86,811,460	34,080,765
1935	91,762,201	37,316,185
1936	105,214,533	41,217,401
1937	126,424,303	49,461,120

Note.—In the above tabulation "other paper" includes book and writing paper, wrapping paper, paper boards, and other paper products.

Drop in Exports of Pulp and Paper

Returns of exports for 1938 indicate that as compared with 1937 there was a drop in the value of newsprint exported of $21,851,370 and a drop in the value of wood pulp of all kinds exported of $14,084,893, a total drop for the industry as a whole of $35,936,263. Preliminary figures issued by the Dominion Bureau of Statistics, as compared with the preliminary figures issued for 1937, are as follow:

Value of Newsprint Exports

	1938	1937
January	$6,816,828	$9,254,137
February	5,964,499	8,011,776
March	8,685,337	10,659,613
April	7,979,896	9,217,217
May	9,135,364	10,733,319
June	8,441,719	11,401,687
July	8,723,502	11,234,434
August	9,621,715	10,662,990
September	8,523,555	11,303,766
October	10,834,212	11,167,970
November	10,838,543	11,572,240
December	9,049,872	11,247,263
Totals	$104,615,042	$126,466,412

Value of Wood Pulp Exports

	1938	1937
January	$2,149,823	$3,072,656
February	2,390,320	2,589,103
March	2,899,451	3,633,388
April	1,813,017	2,817,801
May	2,469,838	3,682,140
June	1,672,126	3,810,638
July	1,867,581	3,630,824
August	2,833,241	3,625,875
September	2,304,564	3,744,448
October	2,502,430	4,520,012
November	2,493,187	3,328,553
December	2,335,160	3,360,293
Totals	$27,730,738	$41,815,731

Research Council's Work

Some of the work of the National Research Coun-

cil at Ottawa during the year was of interest to the pulp and paper industry. For instance, a forest tree breeding program was initiated. Preliminary crosses in poplar, spruce and pine have been successful, and evidence has been obtained to show that crossing to improve poplars is practicable. The object is to breed rapid-growing and disease-resistant poplar varieties suitable for pulp and match stock and for shelter belts for Western Canada. About 10,000 artificial hybrids between a number of native and introduced species have been made and sent as young seedlings to the Petawawa Forest Experiment Station to be grown and tested.

In connection with experiments for the profitable use of by-products, investigation of various domestic barks was continued. Several new barks were examined, including black and red spruce from New Brunswick, alder, white ash, and eastern cedar. Also a thorough investigation of the physico-chemical properties of a concentrated white spruce extract is in progress. A report on the work to date has been published. A new type of tannage for white leather, giving products resistant to hot water, is now under development.

In co-operation with the Dominion Forest Service, tests were made on hose and various types of nozzles used in fighting forest fires. Field tests were made at Petawawa, and a report which will be available to those interested will be published on the results.

The Allied Lumber Industry

The lumber industry, which is an integral part of the business of many pulp and paper corporations, had only a moderately successful year. There was a marked decline in overseas shipments from the eastern provinces, and disruption of the market in the Orient again seriously affected British Columbia producers. As against this United Kingdom buying of B. C. lumber set a new record. Douglas fir shipments to the English market recorded a gain, and red cedar was introduced into Scotland for the first time.

Of most consequence to the industry during the year, however, were the new triangular trade agreements between the United States, Great Britain and Canada. Canadian lumbermen were very apprehensive of their market in the United Kingdom being lost through the concessions made to the United States and were much relieved when the terms were announced showing advantages granted to them in the American market in return for the lower terms granted to American lumber in the British market.

By the agreement between Canada and the United States the duties on a wide variety of forest products were cut in half. This applies to Douglas fir, Western hemlock, Northern pine, Norway pine, Western white spruce, and other spruce, pine, hemlock and fir. Other forest products getting the benefit of a lower tariff include red cedar shingles, maple and birch veneers, hubs for wheels, heading bolts, stave bolts, last blocks, waggon blocks, heading blocks, match blocks, sticks, etc., casks, barrels (other than beer barrels) and hogsheads, paint-brush handles, broom and mop handles, tennis racket frames, toboggans, canoes and paddles, baby carriages, wheel barrows, carriages, drays, trucks, and other horse-drawn vehicles of wood, uncoated printing paper, hanging paper, tissue papers, and crepe paper, tourist literature, and Christmas trees.

The changes in the United Kingdom tariff on lumber to which Canada agreed applies to lumber of which the United States is an important supplier of United Kingdom requirements, and gives to that lumber treatment as favorable as that granted to Canadian lumber on importation into the United States.

Water Power Developments

Once more the pulp and paper industry, which has been one of the main causes of the rapid increase of the hydro-electric industry in this country, has been directly responsible for some new installations and for the initiation of some important projects for the further harnessing of water powers, though in the current use of new power the rapidly-growing mining industry is now becoming a most important factor. For the first ten months of the year some reduction was shown in the output of central electric stations from the figures for the corresponding period of 1937, this reduction being almost all accounted for in secondary power delivered to electric boilers, and reflected a lessened demand for this type of energy in the pulp and paper industry. A recovery of much of this load was in evidence towards the end of the year.

New watar power installations in 1938 aggregated 135,459 horse power, bringing the total for the Dominion at the end of the year to 8,190,772 horse power after this total had been adjusted following a general revision of plant ratings. The greater part of this increase was made up of extensions to existing stations in Quebec, Ontario, Manitoba and British Columbia.

The most important development initiated during the year was in the St. Maurice Valley in Quebec, the centre of the pulp and paper industry in this province. There the St. Maurice Power Corporation has started construction of a 243,000 horse power development at La Tuque, and has ordered the first four 40,500 h.p. turbines for this plant, delivery of these units to start in 1940. In this company are associated the Shawinigan Water and Power Company and the Brown Corporation, which latter has an important enterprise for the manufacture of pulp and allied products at La Tuque. The power plant is scheduled for completion about January 1, 1941. The Beauharnois Light, Heat and Power Company is adding a ninth 53,000 h.p. unit to its giant plant at Beauharnois, near Montreal, on the St. Lawrence River, the new unit to be in operation some time during the present year. Contracts have already been awarded by the Quebec National Electricity Syndicate for construction of a 28,000 h.p. hydro-electric development on the Upper Ottawa River, construction to start in the near future. The city of Sherbrooke has plans and specifications for a 10,000 h.p. plant at Two Mile Falls on the St. Francis River, and it is expected that tenders will be called in the near future. In Nova Scotia a new 10,200 h.p. development at Cowie Falls on the Mersey river went into operation in September last. The output is available to the Mersey Paper Company's mill at Brooklyn. The Minas Basin Pulp and Paper Company completed the construction of its Salmon Hole development on the St. Croix river. It is an installation of 2,770 h.p. and is interconnected with a 4,200 h.p. plant five miles downstream for the supply of power through existing transmission lines to the company's pulp mill at Hantsport. The Annapolis Basin Pulp and Power Company proceeded with construction of its 3,750 h.p. project on Paradise Brook, and it is probable the development will be brought into operation this year.

Paper Men Hold Conventions in New York

D. Clark Everest is Re-elected President of American Paper and Pulp Association at 62nd Annual Meeting of Association at Waldorf-Astoria Hotel — Numerous Affiliated Organizations Also Hold Annual Sessions.

The Sixty-second Annual Meeting of the American Paper and Pulp Association and affiliated organizations was held at the Waldorf-Astoria Hotel, New York, February 20 to 24 inclusive. Following the divisional meetings an open meeting was held on Wednesday afternoon at which the committees submitted their reports and other association matters were discussed.

Election of Officers

At a meeting of the Board of Governors on Wednesday, the following officers were elected:

President, D. Clark Everest, Marathon Paper Mills Company, Rothschild, Wis.

Vice Presidents: W. H. Anders, Nashua River Paper Company, E. Pepperell, Mass.; D. K. Brown, Neenah Paper Company, Neenah, Wis.; Hugh J. Chisholm, Oxford Paper Company, New York; Stuart B. Copeland, Northwest Paper Company, Cloquet Minn.; R. J. Cullen, International Paper Company, New York; R. K. Ferguson, St. Regis Paper Company, New York; Ralph A. Hayward, Kalamazoo Vegetable Parchment Company, Parchment, Kalamazoo, Mich.; H. L. Jenkins, Geo. O. Jenkins Company, Bridgewater, Mass.; J. L. Riegel, Riegel Paper Corporation, New York; John R. Miller, West Virginia Pulp and Paper Company, New York; F. J. Sensenbrenner, Kimberly - Clark Corporation, Neenah, Wis.; Norman W. Wilson, Hammermill Paper Company, Erie, Pa.; J. D. Zellerbach, Crown Zellerbach Corporation, San Francisco, Cal., and New York.

Executive Secretary, Charles W. Boyce, 122 East 42nd Street, New York.

Counsel, Carl E. Whitney and R. E. Canfield, Wise, Whitney & Canfield, New York.

Address of President Everest

D. Clark Everest, the president of the Association delivered his annual address as follows:

This is the sixty-second consecutive annual meeting of American manufacturers of paper and pulp, the sixty-second time when the men whose judgment and experience dominate the policies of most of the companies that make up the industry, have assembled to discuss their problems. I, personally, have attended the last thirty meetings. Many of you have been present at all of these meetings and in some cases more. Too many of our friends, both yours and mine, are not here. Some of them have passed on; some have gotten out of the habit; and some have never attended any meting at which the welfare of the industry, their industry, was discussed.

Each year we establish a new record not only for the American Paper and Pulp Association but for all trade associations. For the American Paper and Pulp Association was the first industry-wide, national trade association to be set up in the United States. In consecutive meetings we date back to 1878; in the idea of mutual self-help we date back to 1819 when representatives of the companies then engaged in the art of paper making gathered in Boston to consider what they could do to save themselves and their industry from complete obliteration under the then existing flood of imports. Ours is a proud record and I am deeply grateful that I have had the privilege of taking some part in the making of it.

We are not here today, however, to gloat over our record. Retrospection on occasion, may be satisfying, but it is profitless unless it constitutes a review for the purpose of determining how best to approach the problems of the moment and of the future.

D. CLARK EVEREST, President

I want to talk to you today not as an individual nor as the President of the American Paper and Pulp Association, but as both of these personalities, and, moreover, as a citizen of the United States who, like you, is steeped in the tradition of American life and government, but who realizes that industry and government must change if they are to make progress. Growth, the realization of its significance in life and business, is the dominating characteristic of a young people. We are still growing, we are still young, but we are losing our relish for the

change that must accompany growth.

It takes but little imagination to realize that in many countries new leaders, presumably representing the manifest will of the people, are striving for something new, something that their people have lacked. Past prosperities and their aftermath, depression and misery, have created no lasting security. Age-long hungers gnaw and many are seeking a larger share of satisfaction. The ways and means vary with the temperament of the people and with the personality of their leaders. The influences are far-reaching, the threats are awe-inspiring. We move irresistibly toward a new world or toward a new war. In either event government will become a more important factor in every-day life and business.

Regardless of what we may think, we in the United States are fortunately maintaining our character in the midst of these changes. We have not resorted to bloodshed. We have kept violence under control. We have maintained the democratic pattern. Gradually we are modifying our concepts and we are delineating our obligations as a people and as citizens. In a vast heroic effort democracy is proving what it can do.

Business men have been slow in realizing what has been going on. They have fought change but in doing so they have undergone a subtle change in their own thinking. At long last, business and industry are moving into the picture. This was emphasized and superbly outlined by Mr. Prentice in his address at the last meeting of the National Association of Manufacturers.

As a ranking industry, the paper and pulp industry cannot lag in assuming its responsibilities in this new picture. By this I do not mean merely that we must protect our interests. I mean much more than purely passive action. I believe that the time for constructive, positive action has come and that we in this industry have a real opportunity to settle some old problem accounts for which we have billed ourselves in every one of the sixty-one annual meetings that have preceded this one. To do this we need something more than we ourselves can give under present legal restrictions. To clarify this I shall quote a statement that is incorporated in the answer of the American Paper and Pulp Association to a question in the recent trade association questionnaire submitted to all trade associations:

"If there were no legal limitations or areas of doubt, it is difficult to predict what the Association's program would be. In basic fundamentals there would undoubtedly be little, if any, change, for the conception of association activity that underlies the program of the American Paper and Pulp Association hinges principally upon service to the *company* rather than service to the industry as a group. The criteria is the company and its welfare, for a strong industry depends directly upon the individual strength of its members. To this end, the program of the Association is directed toward serving the units of the industry so that their individual positions from the point of view of products, market opportunity, and labor and financial stability may be strengthened. The welfare of the industry is subordinated and made dependent upon the welfare of its individual units. There is no attempt to superimpose the judgment of the trade association upon the judgment of company management. We believe, therefore, that the Association program is in harmony with the spirit and purpose of the existing laws.

"However, we have had ample proof in the paper industry that no matter how well the individual companies may be armed with facts concerning the economic status of the industry at any given moment, and their own relative importance in and dependence upon the industry trend, and no matter how farsighted their individual management may be, these individual company efforts are wholly inadequate to stem the occasional downward rush toward economic fatality. Nor can such individual action steady the seasonal and cyclical fluctuations in production which create instability to labor and capital. Neither of these phenomena benefit the public interest and the Association experience over the years seems to indicate that a program rigorously restricted to the limitations of the Anti-Trust Laws is not sufficient to protect the broad public interest that lies in an economically sound paper and pulp industry.

"Undoubtedly if there were no legal restrictions, some efforts would have been made to set up safeguards tending to regularize the basic operations of the industry".

Modification in the language of the Anti-Trust Laws is not a simple matter. Since these laws were first enacted, they have been subject to interpretation through court findings, which has passed through a long series of changes. But such modification has more to do with application than with intent or underlying philosophy. Business men and many in Government are now beginning to realize that there is need for change in intent and philosophy and that considerable revision is necessary to permit accomplishments that will alleviate the economic stagnation in which we find ourselves.

There is a vast difference between the thinking in industry and in Government. Bridging this gap is perhaps the most important first step. In its way, the Government has created an opportunity for reaching a basis of understanding. I refer to the so-called Monopoly Investigation which, if we can believe the statement of its sponsors, is a joint study of the purposes and responsibility of Government and of business. During the course of this study, points of view are being created which evidence hope that a new era of Government and buiness cooperation may be possible.

I speak of these things as a layman without special information but with a deep sense of the needs and of the responsibilities which we as business men cannot dodge with justice to our country, our industry and ourselves. I had hoped that Mr. George H. Mead could be here today to tell you what is taking place in this field. Unfortunately he could not be in town today.

Our own contribution is clear, it seems to me, and we have already taken the initial step. If we are to arrive at solutions of age-long problems we must first determine what those problems are and the conditions surrounding them. The Association is now assembling basic material and the drafting of a report will be started shortly. Whether or not we will be called upon by the National Economic Committee is largely immaterial in so far as this report is concerned for, I believe, it will give us in the industry a clearer understanding of the industry, how it became what it is and the direction in which it is tending.

I suppose if each of us were requested to list the problems which he considers the most important in the manufacture and sale of paper and pulp, we would

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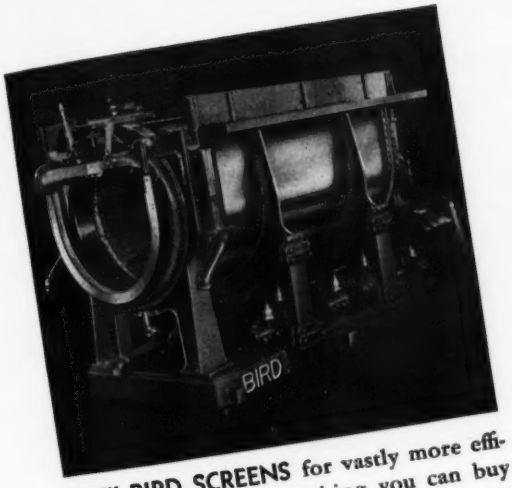

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have a reflection of personal experiences. Undoubtedly there would be agreement in respect to certain problems,—at least in the naming. Detailed formulation, however, would again bring out different personal concepts. Moreover, it is probable that some matters would be listed by some as problems which others would not consider in the problem class at all. In view of this likelihood, it is important that we attempt to formulate the thinking of the industry in respect to its major problems and in doing so to analyze carefully and quantitatively the conditions surrounding them.

We do have in this industry certain conditions which are not common. In the material field we are subject not only to domestic conditions but also to the influence of international financial and political change. At times serious disturbances occur which weaken price structures of the materials and consequently the marketing of all types of paper. The chief difficulty here is that the international influences may not be the same or occur at the same time as those of domestic origin. They tend to spread to our industry trade conditions of which other domestic industries may be barely conscious.

In manufacture we probably have a wider range in productive efficiencies than occur in most industries. In practically every type of manufacture within the boundaries of the industry, old and new machines, large and small companies, converting and self-contained companies are represented, each with its somewhat different set of conditions which are bound to be reflected in marketing practice. Moreover, we have a serious problem in some branches of the industry in the operation of mills which are financially weak.

Many of us consider the flexibility of the industry, which has given rise to what we call grade shifting, a constant threat of operating stability, transmitting from one division of the industry to another the influences of oversupply and of price weakness. Others, thinking in different terms, consider that grade shifting is not wholly an unmitigated evil. It is constantly taking place and within bounds the industry has learned to accommodate itself to normal amounts. As a matter of fact, it is this shifting process that has kept many mills in operation for many years after they had become submarginal in the production of the grades for which they were originally designed. It is when over-expansion in some major block of grades occurs that grade shifting becomes a serious threat.

CHARLES W. BOYCE, Secretary

In the relationship between production and consumption we have another series of problems which have to do chiefly with the basic characteristics of the industry. We are not accustomed to think of paper and pulp manufacture as a natural resource industry, but it is, and it is subject to the general economic and physical conditions which surround most such industries. Through the technical development in the use of materials, the availability of pulpwood supply has been expanded to include most all softwood timber in the United States. No country possesses such vast amounts of available and accessible pulpwood timber, all species considered, as does the United States. There can be no monopoly in resources. There is nothing to prevent any company which has the funds from expanding its production or from building new mills.

In the last two waves which have swept over the industry, expansion was concentrated in relatively short time periods and for reasons which are common in natural resource industries. Capacity was increased far beyond the needs of the moment and the search of idle capacity for market outlets constantly undermined basic markets and this condition, through machine shifting, affected practically every grade of paper.

These and other conditions build up into an aggregate which has over the years created a tremendous downward pressure upon prices. The trend of paper prices has been constantly downward and values in terms of the value of other commodities are hovering around the low record for the industry.

Prices constitute, therefore, a resultant problem of first magnitude. But even here opinion throughout the industry would not be clear-cut. In our thinking of paper prices we tend to concentrate upon the rate of price reduction and the relatively long periods of low prices. We do not always consider the occasional short periods when paper prices are high, sometimes too high in view of subsequent events. It can be easily argued that our chief difficulty arises from these periods when a profit record accumulates which entices new capital into the industry. This new capital in turn disturbs comparative positions and relationships and usually sets in motion a flood of expansion which in a relatively short time bears heavily

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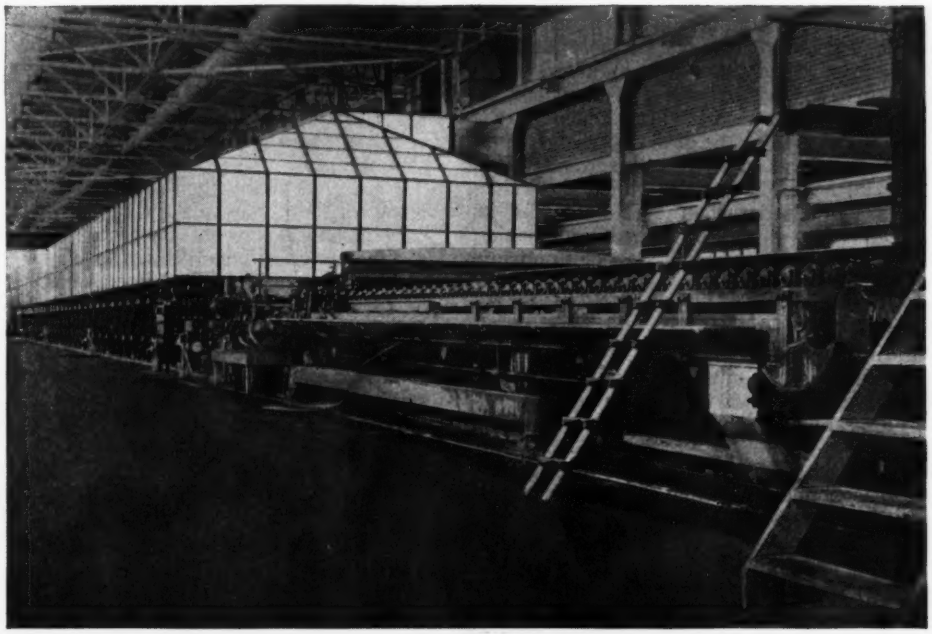

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upon prices. The whole price picture in the industry is complicated by any number of different conditions and trends. In passing, I want to comment upon one trend which sooner or later, if not right now, is causing or will cause considerable difficulty.

The relatively long periods of declining prices and of low prices has piled up pressure upon costs and management is constantly endeavoring to reduce them. In doing so, however, a situation is created which complicates the financial structure and has substantial bearing upon the ability of the industry to maintain a profitable condition of operation. We are too apt in attempting to reduce our costs to build up our capital account. We tend to substitute fixed costs for labor costs. The rate of increase in capital accounts could easily be viewed with alarm. This is especially true where the decline in returns per dollar of invested capital are considered.

This is not a unique situation in the paper industry; it can be argued that it is one of the underlying causes for current maladjustment in industry, which has repercussions in unemployment. But in our industry the new capital expenditures added to the original capital required in the manufacture of paper and pulp do have a somewhat exaggerated effect. In 1937, for instance, the year in which the industry produced more paper than ever before in its history, the operating profits of some 43 companies, exclusive of the International Paper Company, amounted in the aggregrate to approximately the same figure that these companies showed in the period between 1927 and 1929. But when compared with invested capital in the two years, the profit was in 1937 barely one-half of what it was in 1929. We have two trends moving in opposite directions. Our capitalization is going up; our prices are going down.

The time is not far off when our rate of consumption increase is bound to decline and when it does over a period of years we may find ourselves in a very difficult situation.

If we should compile an individual list of solutions in a manner similar to that presupposed in the case of the problems we would again have a wide range of suggestions and probably considerable confusion. Price regularization would undoubtedly be a common suggestion. Price regularization in an industry so widespread, with so many competing companies, becomes a problem in itself so difficult to administer that it would almost certainly be ineffective. Moreover, such a program is not possible under present legal sanction and it is doubtful if change in governmental policy which would be reflected in federal statute, would permit its establishment unless the Government itself participated, perhaps to the point of domination.

In times of violent change such participation might not be objectionable, but considerable change in opinion would be needed before we could willingly accept it as a regular, going adjunct of our business routine.

We may, of course, hope for revision and liberalization of governmental restrictions upon business, but we cannot count on it. In the long run we must be prepared to carry on as our major group work the educational processes that we have followed for more than half a century. The manner in which we do it and its extent will depend upon whatever business laws there may be on the statute books from time to time.

Review of our history indicates that in reality the Association is an educational institution and that it has worked not through the industry but through the people of the industry. This distinction is important because unless it is understood, it is easy to misjudge accomplishments. After all is said and done, and regardless of the alternating conditions of prosperity and depression, we must remember that this is the 62nd consecutive annual meeting of the American Paper and Pulp Association and that there is no other such record.

I read from this that regardless of criticism, of which there is too little, the industry in the long run approves of the principle upon which the Association was founded and upon which it has operated. I read into the criticisms the necessity for further development of a program based upon these original principles.

Such a program is dependent upon a number of different conditions but principally upon two—the development within the industry of personnel capable of the type of analysis that is necessary in a serious, brass tack type of educational program and the development and maintenance of financial and cooperative support.

I am glad to say that we are on the way in both instances, but I say this frankly, we are not keeping pace in either respect. In recent years special and routine activities have grown up which require more and more attention. The time available for the type of thinking which we need the most is too limited. It is because of this fact that the Executive Committee this year recommended a slight increase in the budget. It was to make available additional personnel for staff activities.

Since the end of the code days when the staff budget was cut in half, there has been no change until this year.

Under these conditions there has not been an adequate opportunity to build up the type of personnel that the circumstances require. That is what we are doing today.

As you know, I personally have been connected with the American Paper and Pulp Association in some capacity for a long period of time. I have watched it grow and I have watched it move toward the possibilities that exist for it. I have watched also the need for sound, aggressive and an imaginative representation develop, and I am convinced that over the run of years we have something that will meet the needs if we give it the proper support.

It is through cooperative study, capably staffed, that this industry which in many of its characteristics is still young, can remain young. More and more I believe we must look to a formulation of industry experience and thought for the basis of the type of management which we will need in the future.

Sulphite Paper Association

The annual meeting and luncheon of the Sulphite Paper Manufacturers Association was held on Monday, February 20 at the Waldorf-Astoria. The speakers were D. Clark Everest, president of Marathon Paper Mills Company and of the American Paper and Pulp Association; H. O. Nichols, general chairman, Crown Willamette Paper Company; Charles W. Boyce, secretary American Paper and Pulp Association; I. Zellerbach, chairman of Crown

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Zellerbach Corporation, and George W. Sisson, Jr., Racquette River Paper Company.

The officers elected were:

General chairman, John E. Alexander, Nekoosa Edwards Paper Company; vice-chairman Bleached Group, Harold O. Nichols, Crown Zellerbach Corporation; vice-chairman Unbleached Group, George Stuhr, Southern Kraft Corporation; vice-chairman Manila Group, Rufus L. Sisson, Jr., Racquette River Paper Company; vice-chairman M. G. Sulphite Group, Edgar W. Kiefer, Port Huron Sulphite & Paper Company; Thomas J. Burke is secretary-treasurer.

The following were elected to the Board of Governors in addition to the above officers: Martin A. Brown, Parker Young Company; Aubrey Crabtree, General Manager Fraser Industries Inc.; Walter B. Merlin, Hollingsworth & Whitney Company; Leroy F. Porter, Northwest Paper Company; John Stevens, Jr., Vice President, Marathon Paper Mills Company; Rufus I. Worrell, Mead Sales Company.

Report of Chairman Nichols

It is a great pleasure to welcome so many of the members here today. As your general chairman I want to give you a brief report of my stewardship. I have considered it an honor and certainly it has been a pleasure to have served you for the past two years. Now that I am soon to relinquish the chair to my successor, I hope to continue my efforts and my contacts with you gentlemen in some other capacity.

Thanks to the whole-hearted cooperation of your secretary-treasurer, Thos. J. Burke, your Board of Governors and particularly to the small executive committee consisting of Walter Merlin, George Stuhr and Rufus Worrell who have met many times during the past two years and whose sage advice and guidance contributed much to whatever success this Association may have had.

We shipped 354,574 tons in 1938 as compared with 393,000 tons in 1937—a decrease of 39,000 tons. The average value per ton which we netted on this paper at the mill was $90.58 which compared with $93.97 in 1937 represented a decrease of $3.39 per ton or about 3.6 per cent.

Despite the fact that our shipments decreased nearly 10 per cent and the value of these shipments dropped off over 13 per cent, 1938 could not be called a bad year. Compared with a net value per ton of $85.10 in 1936, $90.58 for 1938 is not too bad a showing. You will remember we though 1936 was a good year. In fact, we shipped in 1936 within 2000 tons of the total for 1937. Despite a much smaller volume of shipments in 1938 we netted $5.48 per ton more than we did in 1936. This increase of $5.48 on 354,574 tons made a difference of $1,943,000 over and above what we should have obtained had we sold at 1936 prices.

It is interesting to note in this connection that Bleached papers in 1938 sold at an advance of $5.78 per ton over 1936 and Unbleached at $4.84 per ton over 1936, while Manilas and M. G. Sulphite papers sold at increases of $5.94 and $5.12 per ton respectively.

You will see that all groups have shared in this trend toward higher prices which, after all, merely reflects the increased costs that we have had to absorb during the past two years. In fact, the price decreases that took place in 1938 as compared with 1937, although small in this division of the industry, were surely unjustified as all our profit and loss statements published to date have shown.

In conclusion I want to remind you that during the past year the Association operated at a cost of only 8 cents per $100 net sales value, plus 3.8 cents which we paid over to the American Paper and Pulp Association. We did not exceed the budget but, as always in hard times, we found it very strenuous going. As you know when business falls off and our receipts diminish, our Association expenses are apt to increase rather than otherwise. We were forced to dip into our surplus to finance operations during the year.

You will remember that when we found surpluses accumulating in 1936 and 1937 we did not wait until the end of the year before reducing our rate of assessment, the deduction in each case being 1 cent per $100.

The present rate of assessment is the lowest at which this Association has ever operated but while it is now necessary for us to increase this slightly to 9 cents per $100, we feel that it is a low rate.

In my report last year I pointed out that during the previous 3 years our tonnage had averaged between 390,000 and 400,000 tons and stated that we estimated we should ship the same amount of tonnage this year. Of course this estimate was not reached and our tonnage showed a decrease, as stated previously, of 9.8 per cent. However, for the first 4 weeks of the current year orders received averaged over 700 tons better than the previous year for the same period. This represented an increase of nearly 10 per cent. It is our belief that we shall more than make up the decrease in tonnage shipped in 1938 as compared with 1937 and, moreover, that this tonnage will be shipped at increasingly higher prices.

Address of D. Clark Everest

I am glad to have this opportunity to be with you again and to review our past year's performance in the paper industry. I have always assumed that people engaged in business for the purpose of securing "margins of profit." When Fortune Magazine, in one of its articles published about two years ago, referred to the "cockeyed economics" of the paper industry, I do not think it was so far off. The past year has certainly demonstrated that we were "cockeyed" in the handling of our business. I do not refer to your association, particularly, as I think you have done a good job, considering the conditions existing in competitive lines, but to the industry as a whole. I do not recall a time when everything seemed to be so well set for a relatively decent year from a profit margin standpoint.

A year ago when this meeting was held, we had gotten through to the end of February without any serious change in the price structure, although volume had been at a very low ebb. Up to that point, people seemed to realize that 1937 had been a crazy year in many respects and that it was only a natural thing that volume should decline during the last quarter of the year. True, January and February had not shown much activity, but again it was a well known fact that inventories in the hands of distributors and consumers were being used up, and that there must come a period of purchasing. This did happen, and there was no excuse for anyone in this industry not knowing the trend of business, as every divisional association and the American Paper and Pulp Association were giving them information

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as to the facts relative to orders received, production and shipments, every week.

Despite all the efforts of associations to get the facts to the individuals, we witnessed some of the most asinine performances we have ever experienced in the industry. It was evident during the early part of the year that demand would be strong and that a reasonably good rate of operation was assured. During the major portion of the year production and shipments were constantly on the up-trend and prices constantly on the down-trend. This not only applied to the price of paper and paper board, but to all the converted articles as well. Who benefited by such action? Certainly not the primary manufacturers, the distributors, or the converters. If any of our friends, who convert our products, have been able to make a satisfactory profit—it is because of their turnover in relation to capital investment.

Few people seem to realize that the paper manufacturing industry as a whole is a "one to one" business. By this I mean that annual sales are about equal to plant investment and working capital. When you are in that position, mistakes in policy—either in sales, purchases, or any other important feature, cannot be readily rectified. Every one of us know that we are faced with constantly increasing costs, and yet we as individuals seem to give no consideration to these increases in fixing the pricing policies of our companies.

Take one or two items of taxation which are of comparatively recent origin—the Social Security and Unemployment taxes. Do you know how much you have contributed to the government for these two items alone? I know, if you do, you realize this is a serious tax and, furthermore, your rate of contribution to the Social Security fund is fixed by law and increases constantly over the next few years. Also, next October you are faced with another limitation of hours, only two hours weekly but it represents a reduction of over 4½ per cent and surely your experience from October 1938 to date has indicated that you do have increased costs through restriction of hours.

Perhaps some of you may have contracts for pulp for delivery this year on the original high cost basis, or increased quantity on an adjusted basis, over 1939 and 1940. Such contracts are not going to make for lower costs.

Minimum labor rates for this industry have not yet been fixed. I doubt if this will have much affect on this industry as, with a few exceptions our rates are high as compared with other industries. High rates mean high labor costs, and I venture to say that your labor costs per ton are higher today than they were ten years ago when we were supposed to be paying high wages and enjoying prosperity.

Transportation costs have been increased and in all probability will again be increased. I see nothing in the picture which points toward lower costs.

Things move faster than ever before, and if we are to keep pace with the ups and downs of business activity, we must change our pricing policy so as to cover shorter periods of time. Heretofore, the paper industry has usually managed to "miss the boat." We get around to the point of screwing up our courage to ask fair prices for our products about the time the demand has fallen off and production is on the down-hill side. Any industry which makes about two per cent on its invested capital certainly cannot be accused of maintaining exorbitant prices for its products. I do not know of a single grade of paper which is not under priced. In your own division reports show that prices are from $6.00 to $12.00 per ton under the fourth quarter prices for 1937.

If we are to have any participation in any prosperity which may come about through an improvement in general business, we must give earnest consideration to getting a fair price for the goods we manufacture and must do it promptly. The year ahead promises a relatively good volume of business. There has been a lag during the last few weeks, but now there seems to be a slight upturn, and if the majority of those who predict business activity are correct in their estimates, we are due for a rate of activity around 85 per cent of capacity, and should gauge our sales policy accordingly.

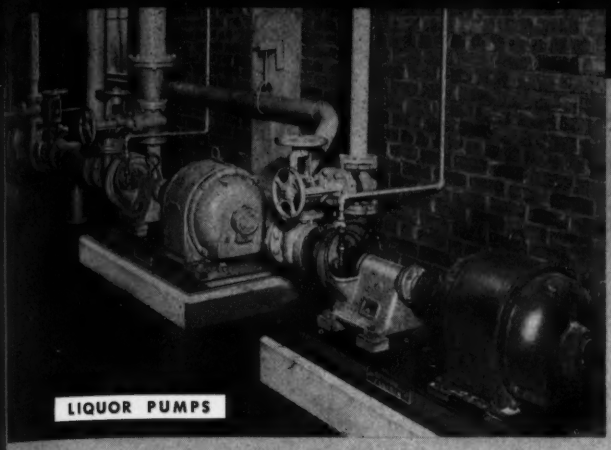
Because of certain peculiarities of the industry, you, who represent your companies in this division, are chiefly concerned with sales. Your activities in your divisional association are, therefore, largely centered in marketing and the development of information which will improve marketing conditions.

In this field, I consider that the Sulphite Paper Manufacturers' Association has done a remarkable job and I wish, personally, to congratulate you and your organization. I know that it has not been an easy job. My company is one of your members. You are flanked on one side by a rapidly growing kraft industry; on another side by the manufacturers of bleached papers; you are greatly concerned in other fields by the use of semi and fully bleached sulphate pulps in your grades. Even improvements in the quality of groundwood pulp influence your competition. Moreover, some manufacturers of your products have not been able to make ends meet; their competition is difficult. In spite of this, however, you have piled up a proud record of achievement in recent years.

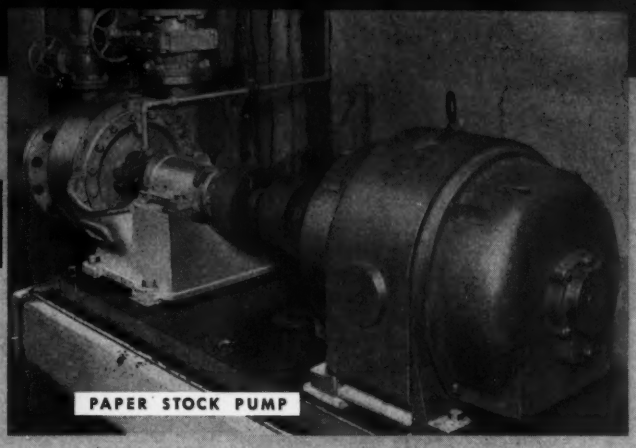
I want to talk to you frankly about another phase of our group work, which perhaps you do not appreciate so much. It is the need for and the accomplishment of organization work in fields other than marketing. Many of you here may not appreciate the importance of these other cooperative activities; you may feel that given market information, clear understanding of the relationship of supplies and demand, and a tolerant understanding of the policies of the different companies that make up your division, other things can take care of themselves.

As a member of your association, also as one thoroughly interested, not only in sales but in the management of properties, I want to tell you that group work in marketing is not enough—important as it may be. Let us look at the broader picture for a moment. The principal reason for organization work is to better the opportunity for each company to meet its employment, financial, and customer requirements. To do this, something more than standardization of grades, the formulation of trade customs and the dissemination of market information is needed. In their place, group work in raw material and operating fields are just as important, and the one who establishes the policies of your company is, or should be, just as keen for information and service in these matters as you are in sales.

It is with these fields that the American Paper and Pulp Association, with its various agencies and the Import Committee, are chiefly concerned. I shall not attempt to discuss, now, the detailed accomplishment



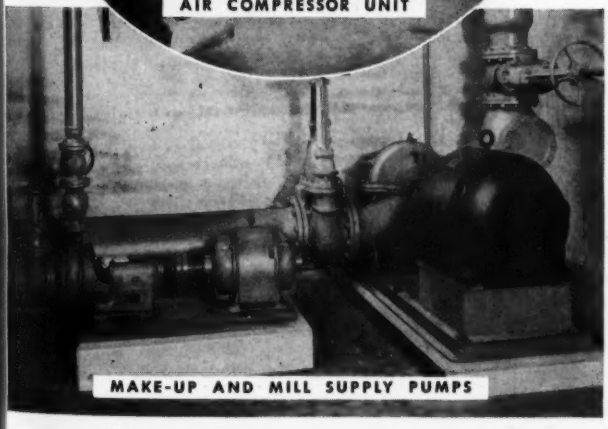
LIQUOR PUMPS



PAPER STOCK PUMP

INGERSOLL-RAND *Equipment in* FERNANDINA MILL *of* CONTAINER CORP. *of* AMERICA

AIR COMPRESSOR UNIT



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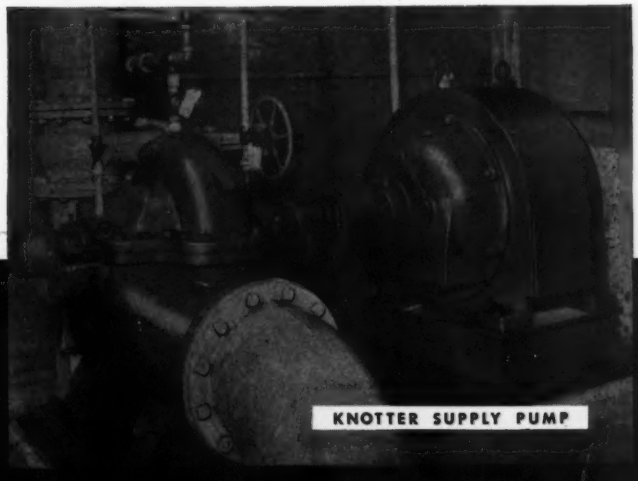
Let one of our engineers help you with your problems. Their experience combined with yours may help you to reduce operating costs.



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Chicago	El Paso	Newark	Salt Lake City	Washington

668-14

of these organizations or the necessity from the point of view of company management for further development of their activities. What I want to impress upon you is simply this: That your judgment of these activities, which is expressed in your financial support, should be based upon understanding of the purposes and knowledge of what is being done.

This is particularly important in your case, for many of you, who hold the proxy of your company in divisional association work, have little to do with labor policy, with cost of operation, or with the innumerable problems that the conscientious manager must face. In these broader matters, you cannot honestly express your personal opinion—you must express the needs of your company.

Again, I want to repeat what I said last year about supporting your divisional associations and the parent association. These agencies furnish you with the tools with which to work. In this age of violent swings in business activity, no one can formulate a policy unless he is in possession of all the latest facts and you can only secure those facts through your association.

During the next few months you will be confronted with many pieces of new legislation affecting your business. There is only one paper industry agency that can keep you informed as to what is going on and how it may affect you, and that is the American Paper and Pulp Association. Our counsel and executive secretary have spent an enormous amount of time on legislative matters and are prepared to spend as much time as is necessary, in the future, looking after your interests.

The past year has been a jittery one. Several times we have faced war scares of no mean proportions. Informed persons seem to feel there will be no war in Europe during 1939 and in my opinion, a major conflict abroad is the only thing which will upset a fairly decent business situation, providing everyone makes an effort to get a satisfactory price for his product.

Our domestic situation, so far as political moves are concerned, seems favorable to business and with this in mind, I hope we may forget, for a time, the European situation and settle down to giving our own business the attention it so greatly needs.

Technical Association Luncheon

The annual luncheon of the Technical Association of the Pulp and Paper Industry was held at 1 o'clock Thursday afternoon in the ball room of the Hotel Roosevelt and was largely attended as this function usually is. The speaker was L. A. Hawkins, executive engineer of the General Electric Company, Schenectady, N. Y., whose subject was "Invention, the Mother of Necessity." Mr. Hawkins spoke as follows:

I sincerely appreciate the honor of the invitation to speak before you, but I feel in coming here to talk about research I am truly carrying coals to Newcastle.

Nearly two years ago, when Westbrook Steele conducted me through the Institute of Paper Chemistry at Appleton, I gained my first conception of the quantity and high quality of the researches supported by the paper and pulp industry. And when I read the titles of the papers to be presented at this meeting, I saw what a large factor research has become and how many of the present activities of this association have sprung from and are being nourished by research. Surely you need no one from outside your industry to expatiate on the nature, the methods, or the products of research.

The industry in which I am employed, the electrical, was a pioneer in industrial research. I can remember when the industrial research laboratories of this country could be counted on the fingers of one hand. Now they number about two thousand, most of them doing good work, and many of them doing splendid work.

Now it has been with no dismay, but with glad enthusiasm, that we in the electrical industry have watched the "gaining on us" of research in other industries, for we firmly believe that research by one benefits all, and that the more good researches there are in progress, the greater is the prospect of continuing national prosperity.

But the more generally research enters into our industrial world and the more familiar it becomes to everyone, the more difficult it is, in a general talk, such as this must be, to say anything new and worth while.

While meditating on that disturbing fact, after accepting your invitation extended through Mr. Macdonald, I happened to run across an article by the vice president in charge of research of one of our largest corporations. That article, while written in the author's characteristically breezy and delightful style, and while containing much I agreed with, nevertheless definitely irritated me. I think most research men would have recognized the fallacies I saw, but the general public would not, and might derive from the article what I would consider a mistaken and highly unfortunate idea of research. It is because of the latter thought, and not because of my irritation, that I decided to make that article the spring-board to take off from.

The main thesis of the article was to show that the field for discovery and development is unlimited because of the extent of our present ignorance. With that thesis I agree. But the author, to sustain his point on the extent of our ignorance, seemed to think it necessary to belittle scientists and their methods. Here I most heatedly disagree.

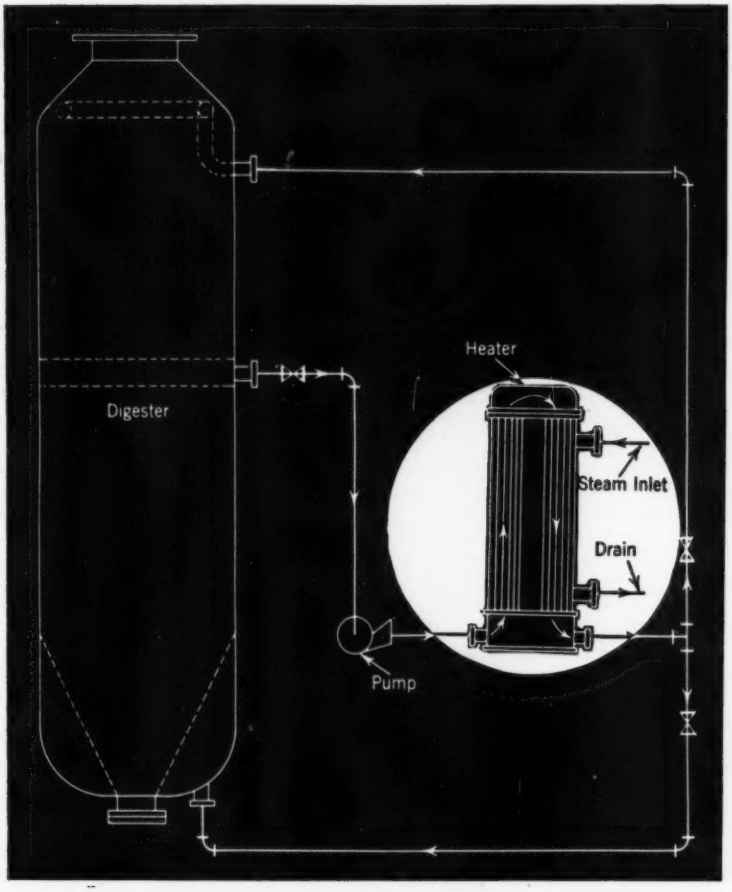
I believe that the progress already made by science is marvelous. I believe that we have learned far more about the fundamentals of things in the last fifty years than was learned in the entire past history of the human race. I believe that scientific progress is constantly accelerating, and that it is to that progress and to that alone that we can look for the materials for the more important future developments for the good of mankind.

There is no inconsistency in the coexistence of extensive ignorance and extensive knowledge. Someone has said that knowledge is like an expanding circle,—the more it grows, the greater is its periphery which marks man's contact with the unknown. It is only as our knowledge expands that we realize how much remains that we do not know.

Lest you think me unfair to the article in question, let me quote from it verbatim.

"We don't know very much about anything. And that goes for scientists, too. In fact, I've come to the conclusion that a scientist is a fellow who doesn't know what he's working on and is afraid to admit it.

"If we took the Greek and Latin synonyms out, our scientific books would be about one-third the size they are."



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Let me concede at once that there is a superficial plausibility in those statements. I have admitted, and any scientist would agree, I think, that the field of our ignorance is vast.

Revision of Ideas

You remember that Aristotle explained the falling of bodies by their characteristic of heaviness, from which it followed that the heavier a body the faster it would fall. So great was Aristotle's authority, that that fallacy endured for 1900 years, until one day a young monk in Pisa climbed the Leaning Tower with two unequal weights and dropped them together. The simultaneous thud of those two weights on the ground marked the beginning of the most important era in history, the era of modern science, for Galileo had proved to the world that the road to truth is through experiment.

As men gradually learned that lesson, and systematic experimentation began, a new world began to open before the astonished eyes of mankind, a world containing new things, the existence of which had never been suspected. For those new things, new names had to be invented, and so the language of modern science grew up. It was natural that for these new names, recourse was had to Latin and Greek roots for they are familiar to linguists of all countries. Hence the plethora of Latin and Greek names in modern scientific literature, of which the article I have referred to so bitterly complains. I have counted half a dozen such words, recently coined, in the titles of the papers for this meeting.

This coining of new words to identify newly discovered things is a very different thing from the use of descriptive words to cover ignorance. Even modern scientists sometimes fall into the latter error, so ingrained by centuries of error has that fallacy become, but in modern science it has become increasingly rare. On the other hand the multiplication of new terms to identify newly discovered things has been enormous. I recently paged through a few issues of the Physical Review and found that three quarters of the articles dealt with things which would have been wholly unintelligible to physicists, when I first studied physics, 44 years ago.

And now at last I have reached the real point I wish to make. When I first studied physics, it was believed that all the fundamentals had been discovered, and that all that remained was to carry measurements to an additional decimal place. But almost immediately came the discovery of X-rays by Röntgen, of radio-active matter by Becquerel and the Curies, and the identification by J. J. Thomson of the electron, the first new Greek term in modern physics. A whole new world was opened to the physicist's astonished gaze, the world within the atom, and one by one the new building blocks of matter were discovered and named,—the alpha particle, the proton, the neutron, the positron, the deuteron, the mesotron, and the neutrino. Planck showed that radiant energy was not continuous as was believed, but had an atomic structure, the units of which he called quanta. Einstein showed that radiant energy needed no ether to carry it, that the quantity of matter in the universe was not fixed, but that matter and energy are interchangeable, that space is four dimensional and possibly curved, and that all our fundamentals, which we thought so absolute, are relative to the observer. Finally, Heisenberg, with his uncertainty principle, showed that the law of causation, the most fundamental of all laws in classical physics, was not applicable to this extraordinary atomic world.

Physics had to be rewritten, and a new language was needed to rewrite it. The new language itself is important only in that its necessity reveals the enormous advance of scientific knowledge. Old mysteries were cleared up,—the paradox of the ether, the anomalous behavior of photo-electric cells, the origin of luminosity in gaseous discharge tubes and in the aurora borealis, the cause of the Edison effect, the peculiarity of the orbit of Mercury, the age of our earth and of the sun, the extraordinary density of some stars, the mechanism of chemical affinity, electrolysis, and electrical conduction, the crystal structure of metals and many other materials including cellulose, black body radiation, the spectral lines of the different elements, etc., etc.

This new understanding has suggested new experiment, new experiment has produced new knowledge, and so the mutual reaction expands with almost explosive rapidity.

The practical results have been so numerous that their description would fill many volumes. Let me only mention a few in the electrical field.

The discovery of the electron and the experimental determination of its nature have led to the development of the electron tube in its myriad forms, bringing us transcontinental and transoceanic telephony, radio broadcasting, the talking movie, improved X-ray diagnosis and therapy, more efficient electric lamps, photo-electric control of many industrial processes, transmission of pictures by wire and radio and television.

Now the point I wish to emphasize here is that the electron tube, which has brought us all these and many more things, did not owe its development to any preexisting demand, but sprang from the discovery of, and researches on, the electron, researches which revealed the possibility of developing electron tubes of various forms. Finding the applications and selling them to the public came later.

Research and Invention

The author of the article I have quoted has elsewhere defined research as finding out what the public wants and how to give it to them. I would define research, almost contrariwise, as finding new facts which may reveal the possibility of giving the public something they do not know they want.

That is the essential difference between fundamental research and invention. Inventions are usually inspired by perception of an actual or potential need. Such were many of the most important developments of the last century,—the sewing machine, the cotton gin, the harvester, the linotype, the steamboat, the locomotive, and the automobile. These were typical examples of the engineering application of known forces to the service of man,—applications which lightened human labor, ushered in the machine age, shifted the nation's activities toward increasing industrialism, and, while helping to expand our frontiers, encouraged concentration of population in manufacturing centers.

But with the turn of the century a new era dawned. All the obvious things had been done. The geographical frontiers of the country had been reached, the days of the pioneer and squatter were over, nature's

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3.	Can you accurately determine all characteristics of pulp quality?	☐	☐
4.	Can you test out new ideas or develop new products without going to the expense of mill experiment?	☐	☐
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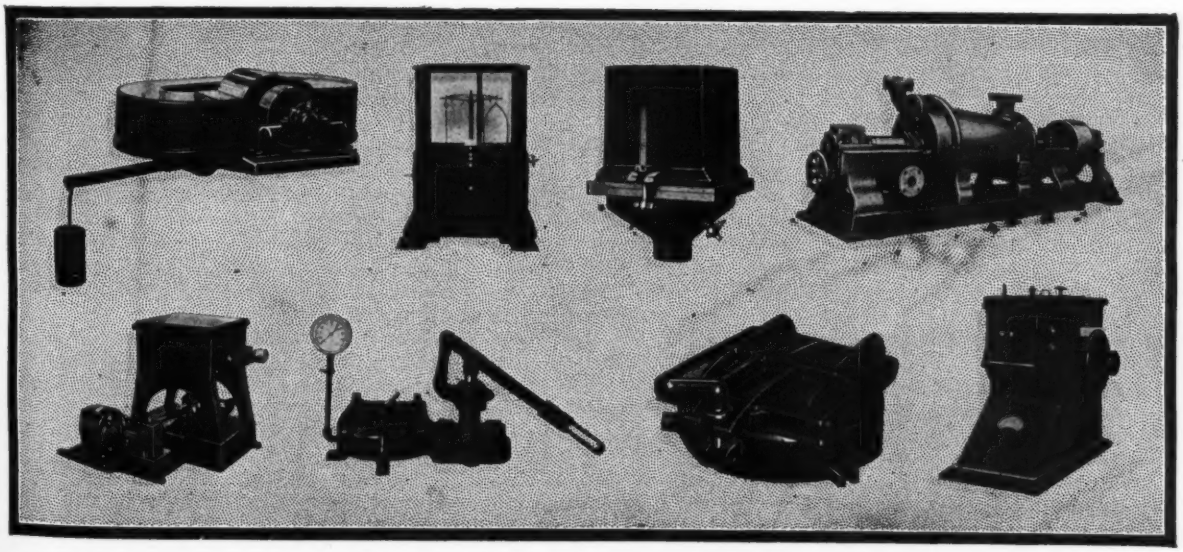

forces, as far as they were known, were being harnessed more and more efficiently, and industrial competition was becoming more severe. Where were the new worlds for the national spirit and genius to conquer?

Some of the country's leading industrialists asked themselves this question, and they grasped the answer. Not all the great developments of the past century came from purposeful inventions to meet public needs. Some had come as the unexpected results of scientific experiment. Experiment had given us the telegraph, the telephone, and wireless, thus establishing a great communications system; experiment had produced the Bessemer and open hearth furnaces, thus building up our great and growing steel industry; experiment had opened the way to electric light and power, thus creating a new industry, the most rapidly growing of all. The photographic industry was the product of experiment. So was the rubber industry. So was the young aluminum industry. So were the other young electro-chemical industries beginning to cluster around Niagara Falls.

If such results had sprung from the sporadic efforts of individual experimenters, working often with inadequate facilities and equipment, how much more might be expected from organized, systematic, cooperative, adequately supported experiment? With this thought in mind, several companies whose activities were based on past research, companies such as General Electric, Bell Telephone, and Eastman Kodak, inaugurated research laboratories, and the domestication of science by industry was begun.

It was a policy which yielded rich returns, not only to those companies, but to the public. Let me give just one example in our own field.

In 1900, when our laboratory was established, it had been authoritatively said that the incandescent lamp had reached such a state of perfection that little future improvement could be expected. But since then our researches have more than quintupled the efficiency of incandescent lamps, while greatly reducing their cost, so that the use of artificial light has enormously increased. If the American public had had only the lamps of 1900 to produce the light used in 1938, the country's lighting bills for the year would have been increased by about 3½ billion dollars, an amount approximating in magnitude even our present enormous federal budgets.

Research and Democracy

Germany had preceded us in industrial research, and how great a lead she had achieved was brought home to all when the World War came and the British navy clamped its blockade on German commerce. The rest of the world found itself, to its dismay, lacking many essentials,—dye stuffs, chloroform and other drugs, optical glass, many special alloys, and some metals such as magnesium. The shock of that discovery gave to industrial research in America such a boost that today we lead the world in that most important of all activities. German research on the contrary is on the down grade. The intolerance of Nazism has not only driven from Germany many of her ablest scientists, but has poisoned the atmosphere of free inquiry from which research draws its vital breath. If, as I firmly believe, industrial strength and economic security rest, in these days, largely on scientific research, then no totalitarian state, however fast it piles up its armaments, however efficiently it regiments its labor, however successfully it molds the popular will into a united front for armed aggression, can in the long run compete with those nations where freedom of thought, of speech and of inquiry enjoy the only atmosphere in which they can live and breath,—the atmosphere of Democracy.

But to return to and to conclude my main thesis. It is an old saying that necessity is the mother of invention, and many inventions did in truth have such origin, but many of the developments most important to our modern civilization have had a far different parentage. Imagine what would happen to a modern city if overnight all telegraphs and telephones were swept out of existence, if the power plants were wrecked, if no street car, subway or elevator ran, if all machine tools in all factories were paralyzed, if all lighting circuits were dead, if all automobiles were stripped of tires and ignition, if our hospitals were deprived of X-ray, anesthetics, and antiseptics. All those things have become necessities and yet, when they had birth no public demand for them existed, nor had the possibility of their existence been recognized, until that possibility was demonstrated by research.

That is the modern way of progress,—research to discover new facts, revelation by those facts of possible new developments, the developments themselves, their acceptance by the public, their adoption into daily life, and their gradual transition from the status of a convenience to that of a necessity. Indeed nowadays it may truthfully be said, using the word "invention" in its broad sense of "discovery", that invention is the mother of necessity.

The number of such necessities is a measure of the standard of living, and to achieve more and more new developments, which may become necessities of the future, we need more and more research. Organized scientific endeavor is a crusade for better living for all, and I congratulate you on the important part in that crusade which is being supported by the Pulp and Paper Industry.

At the luncheon the TAPPI medal for outstanding service in the technical advancement of the pulp and paper industry was presented to J. Newell Stephenson by George Carruthers. This feature of the luncheon is fully covered elsewhere in this issue.

Import Committee Report

The report of the Import Committee presented by Warren B. Bullock, manager, was as follows:

This is the fifteenth anniversary of the formation of the Import Committee of the American Paper Industry. It is sufficient to say that during all these years the Committee has stood firmly upon the policy and program on which it was founded. Its methods have remained unchanged during all that period, and have satisfactorily stood the test of time. The Committee's staff and counsel are proud to believe they have earned the confidence which the Paper Industry has evidenced in the Committee's work and its personnel.

One year ago, the paper industry was facing the threat of reduced duties through proposed reciprocal trade agreements with Great Britain and Canada. Since that time agreements have been concluded which reduced the rates of duty on many grades of paper. It should be stated that the Canadian agreement reduced the duties levied by both countries on various types of paper. It should also be stated that the changes under the Canadian agreement were

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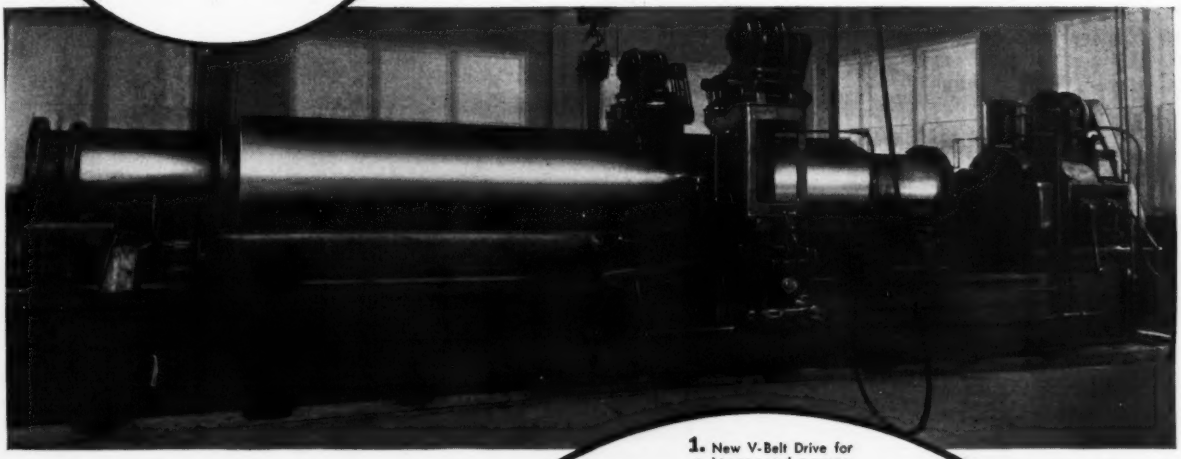

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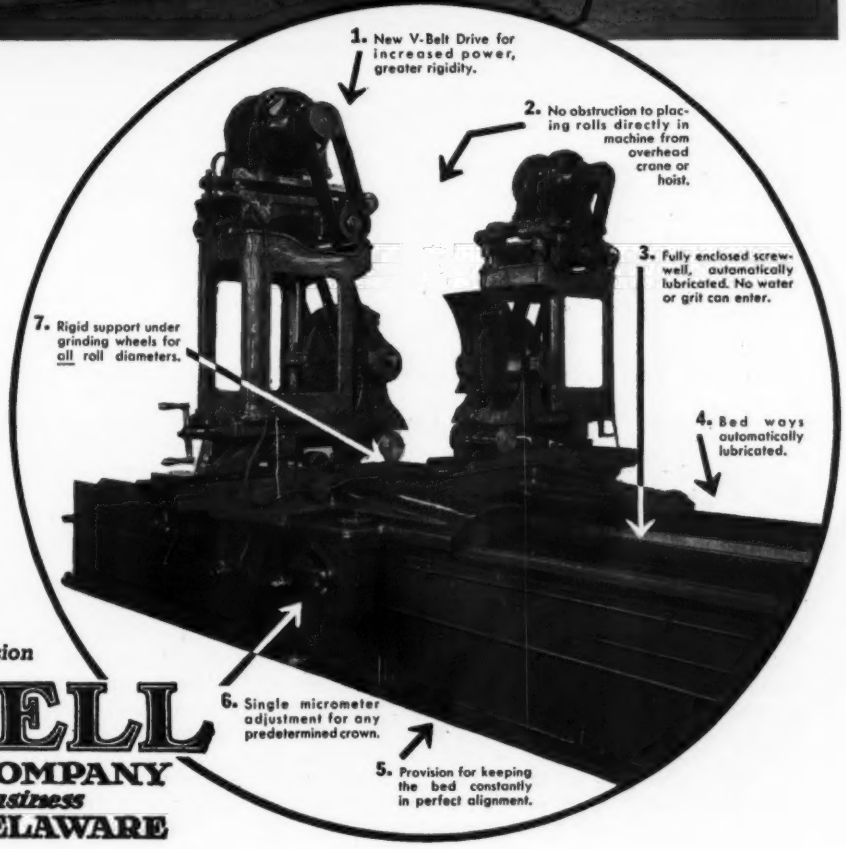
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made, we believe, by the United States and Canadian Governments against the expressed wishes of the American and Canadian paper industries that there be no change in the existing rates. However, the duties were arbitrarily reduced, and what the effect will be no one can now tell, for the new rates have only been in effect a few weeks.

However, the Import Committee will meet all future problems—and they will be many—with the same aggressive activity with which problems have been met in the past, and we hope with equal success.

Kraft Paper Association

Norman S. Stone was elected president of the Kraft Paper Association at its annual meeting held on Tuesday, February 21. Norman S. Stone who has served as vice-president of the Association for the past two years, is general manager of the Mosinee Paper Mills Company at Mosinee, Wis. E. R. Gay, vice-president of St. Regis Paper Company, was elected vice-president of the Association. The executive committee will be composed of Messrs. Stone and Gay together with W. H. Anders, Nashua River Paper Company; J. M. Arndt, Gaylord Container Corporation; J. A. Auchter, Nekoosa-Edwards Paper Company; J. H. Cowhill, Tomahawk Kraft Paper Company; H. S. Daniels, Union Bag and Paper Corporation; W. J. Henry, Southern Advance Bag and Paper Company; R. A. McDonald, Crown Zellerbach Corporation; C. R. McMillen, Chesapeake-Camp Corporation; J. R. Miller, West Virginia Pulp and Paper Company, and J. L. Stille, Southern Kraft Corporation. S. M. Hudson is secretary-treasurer of the association.

W. H. Anders, retiring president, was presented with a diamond ring by members of the association as a token of their esteem and in recognition of the service he had rendered to the Industry during the period he had headed the association. The presentation was made by H. W. Ellerson, who reviewed the problems which had confronted the industry during this period and pointed out how under the constructive leadership of Anders the association had made excellent progress in solving these problems. There was presented at the meeting a statistical analysis and review of the past year's activities and plans were made for the future work of the association. Following completion of the business session the members held a group luncheon.

Paper and Twine Club Dines

The third annual dinner of the Paper and Twine Club, was held in the grand ballroom of the Waldorf-Astoria Hotel, New York, on Wednesday, February 22, with more than six hundred present. The guests of honor were United States Public Printer, A. E. Giegengack, and Homer J. Buckley, Chicago printer. Frank P. Vaughan, president of the Club, was toastmaster.

The feature of the evening was Lowell Thomas, radio commentator, who held the attention of all present with the narration of his experiences in broadcasting. In reply to the often asked question, "What kind of news brings the greatest returns?" Mr. Thomas related the story that it was probably his remark made some years ago of the discovery of some ancient skeletons near the River Shannon, that they were probably those of the forbears of Pat and Mike. Before he had concluded his broadcasting period the NBC telephone lines were clogged with complaints from sons of Erin.

Radio history was made, Lowell Thomas said, when the Western Union made the offer while he conducted his broadcast from the company's Hudson Street headquarters, of free wires for all who wanted to send a telegram to him. The response was 266,000 letters. Of these, 1000 were signed "Mae West" and a man from the West wired in four chapters from the Book of Job.

Mr. Buckley in speaking on salesmanship said that as a business is organized to produce something and to sell it at a profit, selling is the most important phase of business. It is a fallacy, he asserted, that the public will automatically buy the best, reward industry and hard work, and know what it wants. Selling, he said, is the major problem of the paper industry.

The Skating Marvels or the Cyclonic Roller Skaters, contributed to the entertainment and were identified as one of the hits of the "World's Fair Follies."

The banquet committee was in charge of Charles C. Walden Jr., of Walden Sons & Mott, New York. The officers of the Club are: Frank P. Vaughan, Bay West Paper Company, Green Bay, Wis.; vice-president, Edward P. Magel, Crescent Paper Company, Indianapolis, Ind.; secretary-treasurer and counsel, John L. Richey, Hotel Sinton, Cincinnati, O.

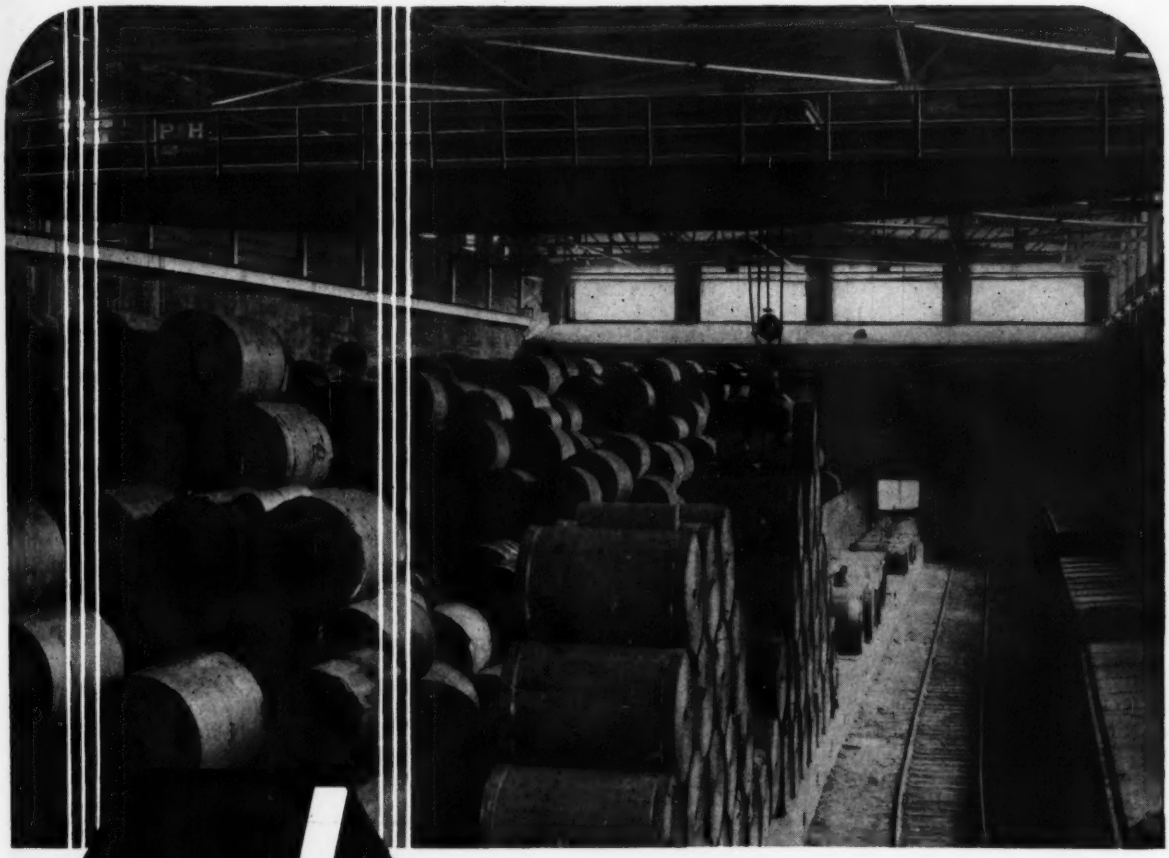
Cardboard Manufacturers Association

The annual general meeting of the Cardboard Manufacturers Association was held on Tuesday, February 21, at the Hotel Waldorf-Astoria. All of the incumbents were re-elected, as follows: President, John B. Van Horn, Holyoke Card and Paper Company, Springfield, Mass.; vice-president, Malcolm B. Lowe, Lowe Paper Company, Ridgefield, N. J.; secretary-treasurer, James L. Ritchie, 122 East 42 street, New York, N. Y.; Chairman, Clay Coated Blanks and Miscellaneous Cardboards Group, J. A. Moses, Falulah Paper Company, Fitchburg, Mass.; Chairman, Photographic Mount Group, Herman Harrigan, District of Columbia Paper Mills, Inc., Washington, D. C.; Chairman, Clay Coated Tag Group, F. C. Heinritz, Appleton Coated Paper Company, Appleton, Wisconsin.

The executive committee includes: Donald V. Lowe, Lowe Paper Company, Ridgefield, N. J.; Herman Harrigan, District of Columbia Paper Mills, Incorporated, Washington, D. C.; Joseph A. Moses, Falulah Paper Company, Fitchburg, Mass.; F. C. Heinritz, Appleton Coated Paper Company, Appleton, Wis.; Malcolm B. Lowe, Lowe Paper Company, Ridgefield, N. J.; John B. Van Horn, Holyoke Card and Paper Company, Springfield, Mass.

Paper Mill Supplies Dealers Meet

The New York Association of Dealers in Paper Mills' Supplies, Inc., met in the East Ballroom of the Hotel Commodore for its Thirty-first Annual Banquet on Wednesday evening, February 22. As is the case every year, there was a large crowd in attendance, every member of which enjoyed the excellent dinner and variety entertainment presented after the dinner. The following companies had tables reserved for them: Ace Baling Wire Company of N.Y.C., M. C. Alper & Son Inc., Atlantic By-Products Corporation,



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Bristol Board Group

The Bristol Board Manufacturers Group held its annual meeting Monday, February 20, at the Hotel Waldorf-Astoria. The following officers were elected: Chairman, James B. Ramage, Franklin Paper Company, Holyoke, Mass.; Vice-Chairman, Joseph B. Holmes, Chemical Paper Manufacturing Company, Holyoke, Mass.; Secretary-Treasurer, James L. Ritchie, 122 East 42 street, New York.

The following were elected members of the executive committee: E. I. Worrell, Wheelwright Papers, Incorporated, 230 Park avenue, New York; R. G. Westad, Waterfalls Paper Mills, 21 East 40 street, New York; James F. Ryland, Standard Paper Manufacturing Company, Richmond, Va.; Norman Harrower, Linton Brothers & Co., Fitchburg, Mass.; Kendall Wyman, Champion Paper and Fibre Company, Hamilton, Ohio; Edward Bailey, Hollingsworth & Whitney Company, 230 Park avenue, New York; B. C. Hopper, Hopper Paper Company, Taylorville, Ill.; Carlton W. Smith, Miamisburg Paper Company, Miamisburg, Ohio.

Roll Toilet Division of Tissue Association

The meeting of the Roll Toilet Division of the Tissue Association was held at the Waldorf-Astoria on Saturday, February 18. The past year's statistics and operations were reviewed and the meeting voted to instruct the association to watch closely and publish all cases in which manufacturers are found selling short count merchandise.

The following officers were elected:—Bert I. Reider, Victoria Paper Mills Company, chairman; Milan Boex, Northern Paper Mills, vice-chairman. The executive committee includes: Henry Wintgens, Hoberg Paper Mills; Irving Wood, Phoenix Toilet and Paper Manufacturing Company, Inc.; Samuel Lopin, Mazer Paper Mills; A. Corman, Ashland Paper Mills, Inc., and William Watson, Wortendyke Manufacturing Company.

Glazed and Fancy Paper Association

The annual business meeting of the Glazed and Fancy Paper Manufacturers' Association was held Monday, February 20, at the Commodore Hotel, New York.

Officers elected for the ensuing year are: Harry B. Conklin, president, Louis Dejonge & Co.; Leo R. McDevitt, vice-president, Blackstone Glazed Paper Company; Arthur A. Thomas, executive director; Francis C. Heywood, executive committee, the Marvellum Company, to fill unexpired term of Leo R. McDevitt; John N. Hazen, executive committee, of Hazen Paper Company.

Upon adjournment of the meeting, luncheon was served. Guest speaker Charles A. Breskin, editor of *Modern Packaging,* discussed "Package Merchandising," using a motion picture to illustrate the highspots of the lecture.

Tissue Association Elects Governors

At the industrial meeting of the Tissue Association held Saturday, February 18, at the Waldorf-Astoria, the following nine members-at-large were elected to the Board of Governors:—J. M. Conway, Hoberg Paper Mills; William Campbell, Scott Paper Company; A. B. Hansen, Northern Paper Mills; E. W. Kiefer, Port Huron Sulphite and Paper Company; Samuel Wishnick, Park Tissue Mills, Inc.; Dwight Hollister, A. P. W. Paper Company; Benjamin F. Picola, Gotham Tissue Corporation; Z. W. Ranck, Crystal Tissue Company, and George Stuhr, Southern Kraft Corporation. The association went on record as being in sympathy with the effort to provide a sales training program for the paper industry, and commended the association staff and B. F. Picola, treasurer, for their work during the year.

Association of Newsprint Mfrs.

At the annual meeting of the Association of Newsprint Manufacturers of the United States, held at the Waldorf-Astoria, on Wednesday, February 22, the following officers were elected: Chairman, A. L. Hobson, St. Croix Paper Company; Vice-Chairman, Samuel Pruyn, Finch, Pruyn & Company; Vice-Chairman, J. D. Zellerbach, Crown Zellerbach Corporation.

Advisory Committee Members: Gordon H. P. Gould, Gould Paper Company; R. H. M. Robinson, Minnesota & Ontario Paper Co.; Geo. D. Bearce, Maine Seaboard Paper Company; John H. Smith, Hawley Pulp and Paper Company.

R. S. Kellogg continues as Secretary-Treasurer of the Association.

Writing Paper Association

At the 78th annual meeting of the Writing Paper Manufacturers Association, held on February 21, at the Waldorf-Astoria, the following officers were elected: president, A. C. Gilbert; vice-president, J. D. Zink; vice-president, G. P. Lee; executive secretary-treasurer, M. C. Dobrow. Members of the executive committee: H. R. Baldwin; M. D. Bardeen; G. H. Beckett; D. D. Coffin; Bruce Crane; G. B. Fowler; W. J. Garrity; T. A. Hendry; R. S. Madden; E. A. Oberweiser; F. H. Savage; W. B. Zimmerman.

Groundwood Paper Association

The Groundwood Paper Manufacturers Association at its annual meeting at the Waldorf-Astoria, February 20, elected the following officers: president, J. H. Coy, Flambeau Paper Company; East vice-president, Walter Shorter, International Paper Com-

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pany; West vice-president, E. G. Bennett, Escanaba Paper Company.

The board of governors for the ensuing year include the above officers and Aubrey Crabtree, Fraser Industries Limited, and E. G. Murry, St. Regis Paper Company. At the board of governors meeting R. E. Canfield, Wise, Whitney & Canfield, was appointed executive vice-president, and Dr. E. O. Merchant, secretary-treasurer.

Glassine and Greaseproof Association

The Glassine and Greaseproof Manufacturers Association met on Wednesday, February 22, at the Waldorf-Astoria, to hold its annual meeting, at which the officers were elected for the coming year. Paul E. Hodgdon, president, Deerfield Glassine Company, Monroe Bridge, Mass., was re-elected Chairman, and Thomas H. Burke was re-elected secretary of the association. The following comprises the executive committee:—Folke Becker, Rhinelander Paper Company; Harry B. Kuhns, Nicolet Paper Corporation; Paul F. Moore, Westfield River Paper Company; Robert F. Nelson, Glassine Paper Company; J. Lawrence Riegel, Riegel Paper Corporation.

As Chairman of the association, Mr. Hodgdon is also a member of the executive committee.

Paper Makers Advertising Association

At the annual meeting and luncheon of the Paper Makers Advertising Association, held on February 20, at the Hotel Lexington, New York, Floyd Triggs. Reigel Paper Corporation, New York, was re-elected president. Other officers re-elected are: Eastern vice-president, Edson Dunbar, Crocker-McElwain Company and Chemical Paper Manufacturing Company, Holyoke, Mass.; Western vice-president, Gene Colvin, Appleton Coated Paper Company, Appleton. Wis. treasurer, Maurice Park, The Marvellum Company, Holyoke, Mass.; secretary, Richard Faulkner, International Paper Company, New York.

Linweave Merchants Meet

The Linweave Merchants held their annual meeting in the Jansen Suite of the Waldorf-Astoria on Saturday, February 18. The morning session was followed by a luncheon and the afternoon was devoted to a sales promotion program. The final event of the day was dinner at Jack Dempsey's restaurant.

The following are the officers for the ensuing year: David S. Landau, Alling & Cory, New York, N. Y., president; Hugh G. Boyer, Caskie Paper Company, Inc., Charlotte, N. C., vice-president; Thomas C. Price, Barton, Duer & Koch Paper Company, Baltimore, secretary-treasurer.

Waxed Paper Association

The following five members were elected to the board of governors of the American Waxed Paper Association at its annual meeting which was held in the Jansen Suite of the Waldorf-Astoria on Monday, February 20: Edgar Berkley, Waxide Paper, Kansas City; R. C. McCaskey, Minerva Wax Paper Company, Minerva, Ohio; Stuart Moore, Dixie Wax Paper Company, Dallas, Texas; Donald Ramsay, Nashua Gummed and Coated Paper Company, Nashua, N. H.; and A. P. Mitchell, Riegel Paper Corporation, New York.

Shanghai Paper Firms Lose Heavily

Shanghai paper merchants suffered heavy losses on their 1938 business, according to a report received from the office of the American Commercial Attache in Shanghai. One large importing house in Shanghai estimated that the 1938 sales averaged only 1.7 per cent of those recorded for 1937. Much business in the early part of the year was lost to importers and dealers for the reason that stocks on wharves and in warehouses in the Japanese occupied section of the city were not made accessible until April. Many printing establishments were closed or destroyed or moved to Hong Kong or the interior.

Hong Kong merchants profited in the first half of the year by virture of their contact with the interior over the Canton-Hankow Railway. The cutting of communications with the interior and the fall of Hankow in October found them with abnormally heavy stocks of paper purchased at prices higher than those at that time prevailing in world markets. Thus neither Shanghai nor Hong Kong dealers were in good shape at the beginning of 1939. In Japanese controlled areas sales of American bond and banknote papers and also general lines have come to a full stop, replacements being made from Japanese and German sources.

Blotting Paper Association

The general meeting of the Blotting Paper Manufacturers Association was held at the Waldorf-Astoria on Monday, February 20 at 9:30 o'clock. The following officers were elected for the coming year: President—Henry S. Mead, Wrenn Paper Company, Middletown, Ohio. Vice-President—H. Leonard Michaelson, Joseph Parker and Son Company, New Haven, Conn.; Secretary-Treasurer, James L. Ritchie.

U. S. Pulp Producers Association

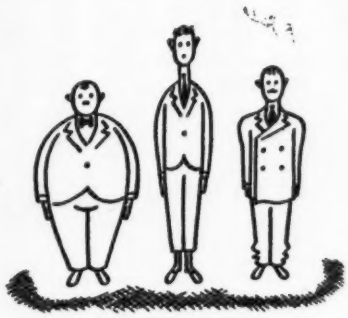
At the annual meeting of the United States Pulp Producers Association, at the Waldorf-Astoria, Monday, February 20, all the present officers and executive committee were re-elected, as follows: President, Amor Hollingsworth, Penobscot Chemical Fibre Company; vice-president, Robert B. Wolf, general manager of the pulp division, Weyerhaeuser Timber Company; secretary-treasurer, O. M. Porter.

Paper Towel Group

The officers elected at the meeting of the Paper Towel Group, Tissue Association which was held at the Waldorf-Astoria on Monday, February 20, are as follows:—Wayne Browne, National Paper Products, Chairman; Frank Vaughan, Bay West Paper Company, Vice-Chairman. Through this election, Mr. Brown automatically becomes a member of the Board of Governors of the Tissue Association.

Specialty Paper & Board Affiliates

The Specialty Paper & Board Affiliates held their general meeting in the Waldorf-Astoria on Tuesday, February 21, under the chairmanship of President P. R. Bachman of the Reigel Paper Corporation, New York. The election of officers will be held at the March meeting of this association.



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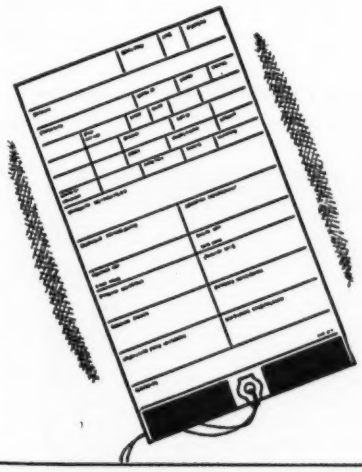

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F. T. Jamison Heads Paper Trade Association

The Thirty-sixth Annual Convention of the National Paper Trade Association of the United States was held at the Waldorf-Astoria Hotel, February 20-23 with a large registration. At the annual meeting held on Thursday, the following officers were elected:

President, F. T. Jamison, Interstate Cordage and Paper Company, Pittsburgh, Pa.; vice-president in charge of Fine Paper Division, P. W. Lesh, C. P. Lesh Paper Company Indianapolis, Ind.; vice-president in charge of Wrapping Paper Division, C. E. Roach, Capital City Paper Company, Springfield, Ill.; treasurer, C. W. Vernon, Vernon Bros. & Company, New York; executive-secretary, A. H. Chamberlain, 220 East 42nd Street, New York.

At the opening session on Monday the speakers were President G. G. Cobean; H. S. Dennison, president of the Dennison Manufacturing Company; J. K. Javits, of Javits and Javits, counsel for the Association, and Dr. Samuels N. Stevens, dean of the University College, Northwestern University.

President Cobean's Address

It is indeed an honor and a pleasure to welcome our members of the Paper Distributing Trade and guests at this opening meeting of the Thirty-sixth Annual Convention of the National Paper Trade Association. We are engaged in a truly great industry, supplying a commodity and service which, because of its universal use, can truly be said affects practically every man, woman and child in the entire nation.

Directly invested in the paper manufacturing and distributing business is a huge amount of capital which qualifies our industry as one of the greatest in the country from an investment standpoint. Tens of thousands of families depend for their personal welfare and happiness directly upon our industry, in its myriad ramifications.

It must be admitted that more than average intelligence, at least, is required to manufacture and distribute to the ultimate consumer the many different kinds of papers and paper products required in our highly developed present-day technological life.

A Cockeyed Industry

Notwithstanding these facts, and admitting the pride we share of being engaged in a useful and necessary industry, such as ours, there must come to all of us moments when we feel certain the writer of an article on the paper industry, which appeared last year in one of our monthly magazines of national circulation, was entirely correct when he stated that 'the paper industry is a cockeyed industry'. There have been times during the past year when I, myself, was convinced he was correct and that while it might not be absolutely necessary to be entirely insane to engage in the industry, that condition would certainly contribute to success in it.

When we scrutinize our balance sheets for the past year and see how miserably small is the margin of net profit of both manufacturers and merchants, we should take time to soberly reflect upon the causes of these unsatisfactory results of a full year of supposedly applied intelligence and effort.

We must first admit there has been an unusual amount of destructively competitive price-cutting in the industry. This has seriously affected the results of operations during 1938, both for manufacturers and merchants. In our industry, these conditions became aggravated to an unreasonable degree when demand is slack and volume low. However, during the past year volume was as high as during some recent years when merchants, at least, had much better profits.

I maintain that, as representatives of an important industry, we should not only meditate over the causes of the unsatisfactory outcome of our year of efforts, but also declare publicly, as American citizens, voters and substantial tax payers what we believe is hindering the progress and prosperity of our great industry.

Suffering from Two Major Causes

Without wishing in any manner to become mixed

F. T. JAMISON, President

A. H. CHAMBERLAIN, Secretary

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PAPER

in a partisan discussion, and speaking personally and not in any official capacity, I believe our industry, like most other industries, as well as most of our citizens is seriously suffering from two major causes, viz:

First: Lack of confidence as to the future, caused primarily by the past hostile attitude of the Federal Administration towards business;

Second: The rapidly increasing taxation load, coupled with justified misgivings as to the ultimate outcome of our government's fiscal policy when it is realized that even this heavy tax load is not anywhere near covering our current cost of government, thus causing steady increases in our public debt which has already reached fantastic proportions.

Let us look for a moment at each of these disturbing and disrupting causes.

Much of this administration's hostility towards business interests has been manifested by well organized campaigns of distrust and fear against the American business system, leading the uninformed to believe the American business system must be made over, and although there have been many changes in personnel in the administration, the philosophy of chief reformer, Professor Tugwell, still persists in many influential quarters. In 1932 he said:

'Business will logically be required to disappear. This is not an over-statement for the sake of emphasis; it is literally meant.'

Conviction Lacking

During the past few months there have been some indications of a disposition on the part of the administration to cooperate with business, but the instrumentalities through which these advances have come do not lend themselves to conviction that there has been any fundamental change in its attitude towards business.

Until such time as the existing lack of confidence by commerce and industry is changed, there cannot occur much improvement in the unemployment situation, and this situation represents what is perhaps this country's most serious problem. The only solution to unemployment must be the return of the unemployed to useful work in industry and commerce. The present government must show more evidence than during the past few years of a sincere desire to play fair with busines before any substantial degree of confidence will be re-established. And until such occurs, we cannot expect any appreciable improvement in the unemployment situation as well as some other difficulties with which our country is beset at the present time.

Now, let us consider the financial and tax situation of this our country in which we operate our business enterprises in an endeavor to earn our livelihoods. We certainly have every right, as free citizens, to do so, for everyone of us is contributing heavily to the enormous funds which our chosen representatives distribute with alarming prodigality.

Prodigality of Federal Spending

It is necessary to refer to some specific statistics in order to comprehend the degree to which the present administration is pushing our country towards bankruptcy and making it increasingly difficult for all of us to make a decent living from our business enterprises.

I have gathered and will give you some startling statistics from various sources, all of which I believe to be entirely dependable and authoritative.

The Federal Government of the United States is spending your money and mine at the rate of $21,000,000 a day. It is collecting in our fast-increasing taxes $14,000,000 each day, thus leaving a rapidly pyramiding deficit of $7,000,000 per day. *And*, this has been the rate of increasing indebtedness *during the past nine years.*

The people of the United States are paying more for government now than at any other time of peace in the nation's history. They are spending about 17 billion dollars a year for government—25 cents out of every dollar of our aggregate income. The national debt has already reached $55,579,000,000 and is well on the way to 60 billion dollars.

Government is now America's leading industry. It has a pay-roll of about 3,700,000 civilian job-holders, not counting relief workers. Altogether, there are about 175,000 government agencies of one kind or another that are spending your money.

Momentarily forgetting that we are not paying more than two-thirds of our present cost of government from taxes now being collected and that we are pushing on to our children the problem of working out from the accumulating load of the other third, let's see what present taxes are doing toward killing industrial and commercial initiative, drying up chances for employment and increasing the cost of living of every man, woman and child in the country.

Survey of American Companies

The American Federation of Investors last year made a careful survey of 150 representative American companies with a total capital investment of 42 billion dollars. Their total 1937 earnings were $3,435,000,000 and they paid in taxes a total of $1,631,300,000, which was 47½ per cent of total earnings and in dividends a total of $1,425,000,000, or 41½ per cent of earnings; thus it is seen that government received 34 per cent more in taxes in 1937 than was paid in dividends to the 5½ million stockholders who invested the money to make these companies possible.

The Chrysler Corporation had 1937 net earnings of $50,730,000 and paid $40,217,000 in taxes.

The American Telegraph & Telephone Co. paid taxes in 1937 totaling $137,600,000, equivalent to $9.21 for each telephone in service in this country, or $525 per each employee.

Notwithstanding these gigantic figures paid by large corporations, in 1937 there were 530,779 corporations filed income and excess profit taxes. Less than half had any net income at all and the total taxes paid by the others amounted to $1,191,000,000, which was less than one-fifth of all taxes collected and less than one-sixth of the government's annual expenditures. The balance, obviously came from individuals, private partnerships, etc., which emphasizes the fact that every individual has a close personal interest in how our elected government representatives spend our money.

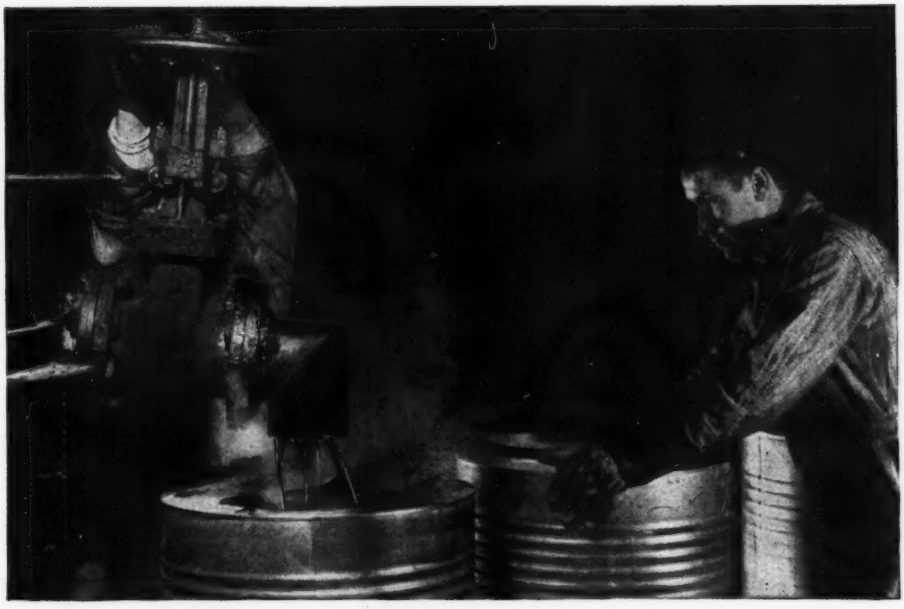
Most of the taxes paid by the big corporations and all other business enterprises filter down eventually to the ultimate consumer, who pays them in terms of higher prices for shoes, clothing, automobiles, food and other necessities of life.

Ghost Taxes

Quite apart, or on top of the multiplicity of kinds

REICHHOLD

SYNTHETIC RESINS



PROMOTING PAPER PROGRESS

Paper makers are rightfully showing a great interest in synthetic resins.

These products of chemistry, created by exact standards to pre-determined characteristics, are widely employed throughout the industry. As an ingredient for overprint varnishes and lacquers, synthetic resins give clearer, paler results. Their substitution for paraffin in wax-treated papers gives a tasteless, odorless, nontoxic product. In heat seal coatings, a non-tacky paper becomes strongly adhesive after treatment.

These and other applications are synthetic resins' contribution to the progress of paper. But they are only the first steps. Research chemists are reporting developments of great importance to the industry, such as synthetic resins used for paper sizing and paper coatings.

Reichhold is in the forefront of this work. The findings of its research staff, including outstanding authorities on synthetic resins, have been the basis for the superiority of Reichhold's products and form the background for the developments that today are promoting paper progress.

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of taxes with which our citizens are now saddled, there are other heavy expenses imposed upon business enterprises by government, which are sometimes referred to as "ghost taxes."

These "ghost taxes" are sometimes invisible and imponderable, but nevertheless as much a drain upon the public pocketbook as the others.

Business now is compelled to employ and pay for the services of expert accountants, tax experts, lawyers and others to draw up and submit the ever-increasing number of tax and statistical reports demanded by government. If mistakes were made, other lawyers and experts must be employed to defend the taxpayer before the Board of Tax Appeals or the courts. All of these have to be paid and represent a further heavy impost upon the exercise of free enterprise.

Back in 1935, one moderately sized corporation had to file 63 separate tax returns. A machinery company, in 1937, filed 292 tax returns in 38 jurisdictions at a cost of $10,000. A floor-covering manufacturer, in the same year, filed 869 tax returns to federal, state and local authorities. A survey for the American Management Association in 1934 showed that it cost 163 corporations three million dollars to pay 127 million dollars in taxes.

Is it any wonder that paper merchants, working with about the same margins of operating profits on sales as they did several years ago, are looking at red figures or insignificant net profits after each year's operations?

The Duty of Leadership

I consider it the duty of those who may be called to leadership in every industry to take every opportunity to drive home to every member of the industry the terrific load which government has placed upon all productively employed people in this country. If the public can be made truly tax conscious, I am confident that our elected legislators will hear from individual citizens in terms which may stop the wild orgy of "pump-priming" and "spending to prosperity" in which we have been engaged for several years, and which practice threatens the welfare of every productive individual in the country and makes it increasingly difficult for any of us to make a decent living in our respective businesses.

What I have said is intended to be entirely nonpartisan, the demands upon our legislators should be made regardless of party and so long as the present fashion in government spending continues, I speak for the survival of private business—not for the election of the candidates of any party.

Address of H. S. Dennison

"In the first place, I don't think that it is any too good for any of us to boast about ourselves and then leave it at that. The prophesying of doom isn't any good for us and is just plain flat silly. We can't possibly know whether the world is going to the dogs or not. It may go tomorrow morning. It may be good dogs or bad dogs. I don't know; nobody can possibly know; nobody has ever known; nobody can call you a liar if you say it will or you say it won't. Hence it is what Bridgman calls 'a meaningless question.' It can't be answered, and therefore it has no true, practical meaning in the asking. Are we going to meet a doom of one kind or another or fourteen kinds that are described, or are we not? I say we can't know. Therefore what? We have to go on some assumption in order to live from day to day. We have to assume that the sun will rise tomorrow morning, and nobody in the room knows whether it will or not. You can only make an awful long bet and probably win.

Referring to the changes in population in England, South America, America and other countries, Mr. Dennison said, "today, the frontiers have been swinging shut for forty years or more. It was not noticed to begin with. I have always felt that the depression of 1907 was highly symptomatic of just that vital change. The most dramatic fact at the moment to show that the situation isn't as it used to be is the difficulty we have finding place for a few hundred thousand refugees, land where we can put them, where they won't crowd somebody else off and where they can nevertheless sustain themselves and not become a burden on someone else somewhere. Fifty years ago, there was so much room for everybody everywhere that there would have been no question raised at all of any such sort.

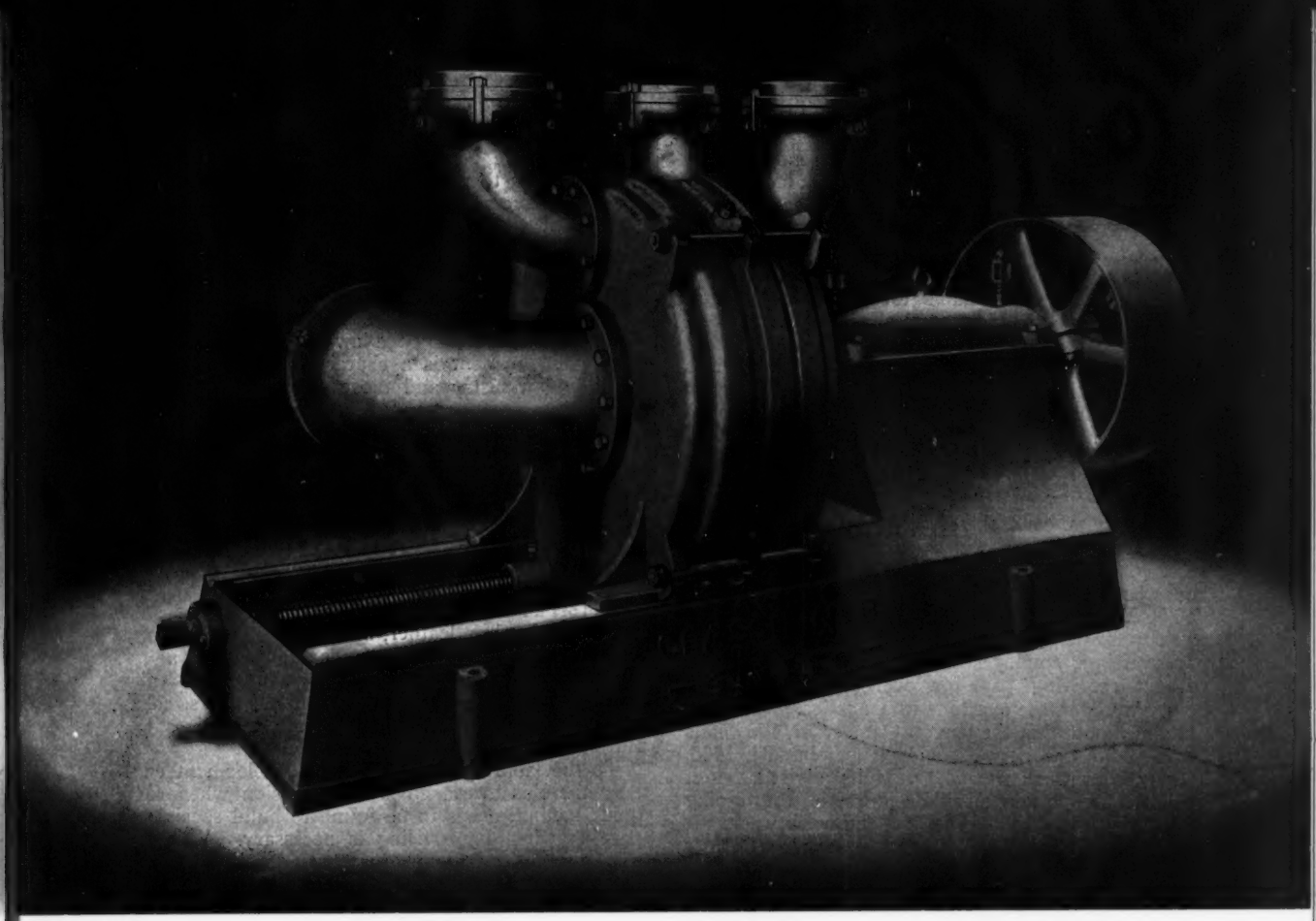
The changes about us, I feel, right from the beginning, can be referred back to the change from the age of pioneering, which was 200 years long, or thereabouts, to the age of settlement, when we must solve our problems in communities practically speaking closed to the escape of masses of people. . . . The problems of today are due to living in a closed community virtually speaking, with a distinctly heavy weight on the safety valve, so that we have got to work things out where we are and we can't escape by going west, young man, which was the slogan so many years in this country.

Not only are we faced with the problems that arise because we are in closed communities, but the engineers and scientists have put us into tighter, closer communities than we could have ever lived in before, more intricately interwoven, desperately interdependent, dependent ourselves here in a city like this upon an army of technicians to keep the water supply and the electric supply and all the rest of it going. We couldn't survive a few days with a highly technical machine to keep us going. Our problems are too complicated for that.

Our problems are decidedly pressing, pressing because we are in relatively closed communities everywhere, and intricate. Can we find our way out of them? Well, if you say no, you simply join those who think this civilization is going to the dogs and you may be right, and you may be wrong, but it is the wrong thing to say anyhow from a practical point of view. In other words, I don't know whether we can solve these things, but we have got to, at least we have got to try."

Dr. Stevens Discussed Training

Dr. Samuel N. Stevens, dean of the University College, Northwestern University, director of education, Industrial Training Corporation, spoke of the salesmen's training program being sponsored by the Paper & Twine Club in which he said the keynote was to have salesmen sell at a profit. The corporation, he said, has available the training techniques in development and improvement of selling in other industries. These techniques, he noted, will be employed in the paper industry and he expressed the hope that merchants will co-operate and reduce the information to a common denominator in order that it may be passed on to salesmen who will undergo an intensive 16-week training program.



WLES CLASSIFINER

IS PAPER MAKING AN ART or is it an exact science? In either case there are certain principles in the preparation of paper pulp that must be adhered to. The problem is to carry out the necessary steps as efficiently and economically as possible.

The constant demand for better papers has necessitated new production methods and improved machinery. At the same time keen competition makes it compulsory to maintain the lowest possible overhead and turn out the finest quality paper.

Since 1868, when we produced our first Beating Engine, we have kept pace with the paper making industry. During these 71 years we have been designing pulp preparation equipment to operate with minimum power consumption and to do the job required the way exacting paper mill engineers demand that it should be done. The Dilts-built Cowles Classifiner is one of these units. It embodies 71 years of experience and skill. The result is a highly efficient unit for defibering and clarifying waste paper stock.

The Cowles Classifiner uses only one-tenth the space and much less power than is usually required for equipment that will produce the same volume of work. It is so constructed that it can be easily and quickly taken apart for repairs or inspection. This unit is designed to fit into systems now in use—permitting a change-over at low cost.

Ask our engineers to discuss your production problems with you. A solution may pave the way to further improvements in stock preparation.

Dilts

DILTS MACHINE WORKS, Inc., FULTON, N. Y.

During this period salesmen will be sent four lessons each week and each lesson will carry an examination sheet which will be passed upon at headquarters. Every two weeks there will be an opportunity for group training which will be made possible by plans now being formulated.

Manuals will be available for group leaders and there will also be special sound films to illustrate certain points. At end of the period there will be sales demonstration clinics and the men taking the courses will be given final instructions upon which successful selling is based. The course will be developed within the industry and guided by those of practical experience.

J. K. Javits on Work Hours

J. K. Javits, counsel, referred to several questions which were most prominent in the minds of members. One of these was "If my work week was 40 hours before the passage of the new law, what do I do?" Mr. Javits, in reply, said that if the normal work week was 40 hours and the policy was not to pay overtime, employes could work up to 44 hours without receiving pay for overtime. Beyond 44 hours, however, the overtime rate, applies.

Pointing out that the law on October 24, 1939 calls for a 42-hour work week and on October 24, 1940, a forty hour work week, Mr. Javits advised that it would be best to take a middle course in determining how many hours shall constitute the work week. It is possible, he said, to raise and lower wages under the law.

He advised merchants to follow the views of the Administrator in reference to interstate business "if it is not too burdensome." If it is, he suggested that it was a "fair business risk" that straight sales out of a warehouse will be intrastate unless there is an intermingling of interstate business. He forcibly pointed out that it is a very serious offense for an employer not to maintain records of employes and said that failure to do so constitutes a criminal offense with employers subject to civil suits on the part of employes who seek to recoup any money due them by failure of the employers to comply with the pay and hour provisions of the law. "Its penalties may grow to the proportion where it might destroy you; therefore it will pay you to meet the provisions of the law 100%."

Roy W. Campbell, traffic committee chairman, reported on the year's activities of his committee and said that many new bills were before Congress, including one known as the Transportation Act of 1939. This bill, he said, offers no relief to carriers as to tonnage and liberalization and that he planned to attend hearings on it Wednesday and Thursday at Washington. Mr. Campbell, it was announced, has been elected president of the Chicago Traffic Club.

Fair Labor Standards Resolution

Arnett W. Leslie, as chairman of the Fair Labor Standards Committee, read the resolution adopted at the semi-annual election in Chicago, in which the association via a committee offered its service to Administrator Elmer F. Andrews in the matter of advising and interpreting conditions in the paper merchandising industry. He queried the Administrator last year and received a letter in November to the effect that the Administrator was proceeding slowly in respect to approving industry committees and that that was the last word received, but during the period of waiting the New York office and counsel have sent bulletins to members in regard to the law and members have also been served with specific answers to their own questions.

Questionnaires will be sent to members and nonmembers and those receiving them will be urged to fill them out promptly so that the committee may have a comprehensive picture. Paper men, he said, in all discussions, concerning the law should point out that steady employment is a characteristic of the paper trade and industry and those engaged in it should capitalize on that point.

The Chemical Formulary

The fourth in a series of volumes the Chemical Formulary has been published by the Chemical Publishing Company of New York, 148 Lafayette street, New York, N. Y., under the editorship of H. Bennett. This 640-page book contains thousands of practical formulae covering such diverse fields as stain removal, bleaches, leather, building materials, waxes, fire proofing, boiler compounds, metals and alloys, mildew proofing, cleaners, waterproofing, inks, photography, rustproofing, paper lacquers, fibers, coloring, cements, resins, oils, lubricants, adhesives and rubber latex.

To the laboratory chemist and development engineer there is everlastingly the occasion when some quick method needs to be found to build special apparatus when improvising is necessary. What cement will be satisfactory or what adhesive will meet the particular need of the moment. To have such a convenient encyclopedia at hand saves much time and investigation.

The section on paper is probably of greater value to laboratory men in other industries than paper manufacture since it deals largely with paper treating and coating processes for special purposes such as fire proofing, making moth repellent, oil-proofing, etc. based on recent patents.

Some writer on research laboratory operation once said that in a research laboratory nothing is ever thrown away. An apparently useless gadget, a pipe length, wire, putty, glass, etc. may suddenly become extremely useful when apparatus is being devised to make an experiment. In a similar manner it is advantageous to have for convenient reference this handbook of practical formula suggestions to meet the hundreds of emergencies that arise in the research laboratory when makeshifts frequently meet the need of the moment and save the time of requisitioning supplies that may take time to obtain.

Copies of this book may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd street, New York, N. Y., at $6.00 per volume.

Install Paper-Making Laboratory

HOLYOKE, Mass., February 20, 1939—The Hercules Power Company has installed a complete paper-making laboratory at its plant in Willimansett, extending the facilities for servicing, research and handling of special and development problems for the paper making trade of this section.

Ralph F. Irwin chief chemist at the new laboratory, has returned to Holyoke, where he was born, from the company laboratories in Kalamazoo, Mich. His assistant will be Harold Miller. Both have been with the Paper Makers Chemical division for years.

BEWOID SIZING

A test in January 1938 made in a paper mill showed through the use of Bewoid penetration 3½ times greater than the regularly sized paper—a 30% cut in amount of size used—alum reduced 50% and a saving in color due to increased brightness.

SVEEN METHOD

Increases wire retention of filler, fibre and color and assists in clarification of white water.

A demonstration can be arranged at your mill without any interference with operating schedules.

PULP-PAPER

SALES AGENTS

BULKLEY, DUNTON PULP CO., INC.

"EXCELSIOR" FELTS

MADE IN CAMDEN, MAINE, BY

THE KNOX WOOLEN CO.

KNOWN BY MILL MEN FOR THEIR LONG LIFE HIGH POROSITY AND INCREASED TONNAGE.

SOLD BY

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295 MADISON AVE. **NEW YORK, N. Y.**

TAPPI Holds 24th Annual Convention

F. C. Clark, Newton, Mass., Is Reelected President of Organization At Meeting In Roosevelt Hotel, New York—Reports of Officers Show Association To Be In Excellent Condition — Splendid Program Is Presented.

At the twenty-fourth annual meeting of the Technical Association of the Pulp and Paper Industry, beginning Monday, February 20, at the Roosevelt Hotel, New York, F. C. Clark, consultant, Newton, Mass., was reelected president of the organization for the ensuing year. W. H. Swanson, of the Kimberly-Clark Corporation, Kimberly, Wis., was elected vice-president and R. C. Griffin, of A. D. Little, Inc., Cambridge, Mass.; V. P. Edwards, International Paper Company, Palmer, N. Y.; F. D. Libby, of the Kalamazoo Vegetable Parchment Company, Kalamazoo, Mich.; and H. H. Harrison, of the Crystal Tissue Company, Middletown, Ohio, were elected to the executive committee to serve for a period of three years.

President's Address

President Clark delivered his annual address at the opening session of the convention Monday morning, in the Ball Room of the Roosevelt, as follows:—

At this, the annual meeting of the Technical Association of the Pulp and Paper Industry, it is the duty of the president to present an address discussing such subjects as are of value to the Association.

History and Growth

This is the twenty-fourth annual meeting of TAPPI and therefore a brief statement regarding its history, growth, objects and accomplishments will, I trust, be an added inspiration to every member to continually give of his time and effort, that in the years to come we may see an even greater TAPPI that has merited and won a still larger part in the development of our industry.

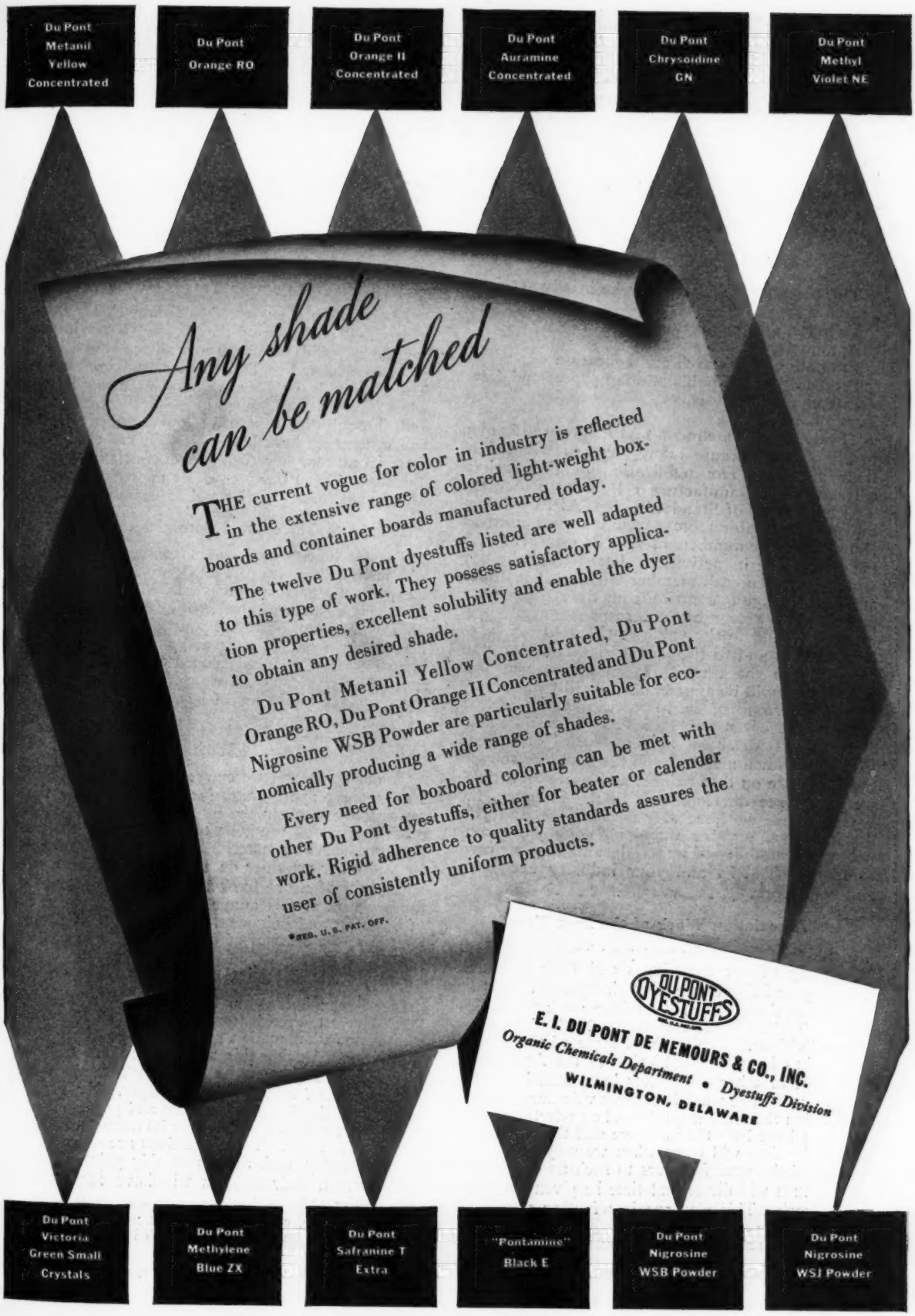
TAPPI is today, as it has always been, a group of individuals. A small group of less than a dozen in February of 1915 recognized the need of a means by which they could meet and exchange technical ideas. An association was quickly formed and at the end of the first year 201 technical men had flocked to follow the leadership of this group. In those early days the pulp and paper companies were often inclined to look with disfavor on the meetings and activities of this technical group. Perhaps even today we may find a question raised here and there as to just how far TAPPI should proceed in its study of the facts of our industry.

A child must grow and a child must learn, and therefore a parent should see that the child may have a chance to grow under the best conditions for maximum development and learn those things that will ensure its greatest use to commerce and industry.

Today TAPPI has 1529 individual members, scattered throughout every U. S. paper manufacturing state. It has a large membership in the Canadian provinces and it has over 200 members in foreign countries wherever pulp and paper is produced. The leaders of that group in 1915 are today among the prominent and active leaders in our industry. TAPPI has grown because of the desire for facts by the individual. TAPPI activities have broadened because some individual has asked for particular information or because a group have offered to meet and discuss some new problem. Our whole committee structure is a development of years, set up to meet the growing needs of our individual members. Such a growth is a healthy one. TAPPI will continue to grow in this same way just as long as we continue to have red blooded members who not being satisfied to toddle in the ruts of grandfather's horse and buggy days, recognize that the best of yesterday will be exceeded by the commonplace of tomorrow. We are in a highly technical industry, involving science, engineering and economics; and by these tools alone

F. C. CLARK, President

R. G. MACDONALD, Secretary


Du Pont Metanil Yellow Concentrated
Du Pont Orange RO
Du Pont Orange II Concentrated
Du Pont Auramine Concentrated
Du Pont Chrysoidine GN
Du Pont Methyl Violet NE
Any shade can be matched
THE current vogue for color in industry is reflected in the extensive range of colored light-weight boxboards and container boards manufactured today.
The twelve Du Pont dyestuffs listed are well adapted to this type of work. They possess satisfactory application properties, excellent solubility and enable the dyer to obtain any desired shade.
Du Pont Metanil Yellow Concentrated, Du Pont Orange RO, Du Pont Orange II Concentrated and Du Pont Nigrosine WSB Powder are particularly suitable for economically producing a wide range of shades.
Every need for boxboard coloring can be met with other Du Pont dyestuffs, either for beater or calender work. Rigid adherence to quality standards assures the user of consistently uniform products.
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Du Pont Methylene Blue ZX
Du Pont Safranine T Extra
"Pontamine" Black E
Du Pont Nigrosine WSB Powder
Du Pont Nigrosine WSJ Powder

may our problems be solved. Much has been said about the art of paper making. This at once attempts to shroud the subject in mystery. The greater the art the greater the mystery and as mystery in industry is usually kept in dark corners, we seldom see it in its true shape. Throw away the mystery in paper making. Study the real facts and we will soon see a definite science develop that will enable us to know the why and how of successful performance. I am proud to be a member of the association which has done so much to place our industry well on the way toward a firm scientific foundation.

Objects and Accomplishments

The objects of TAPPI may be briefly set forth as follows:

Technical developments
Application of the sciences
Promotion of research and education
Presentation and publication of papers and data
Interchange of ideas.

That spells TAPPI

The accomplishments of TAPPI are well known to all of you because many have contributed to their success. The publication of the various editions of the Manufacture of Pulp and Paper, the TAPPI Manual of Standards, the TAPPI Bibliography and valuable reports from many committees show that large numbers of TAPPI members have participated in its activities. I trust that the day will come when each member will feel it his duty and his privilege to contribute his time to some one project each year. Such a response would tremendously add to the value of the association, to its members and to the industry. What can you contribute to the cause? I can assure you that your efforts will be appreciated. Will you become one of the group of active participants in TAPPI work? If every member of TAPPI would select some subject pertaining to the industry of interest to the individual member, and then proceed to read the literature on that subject and write an article, we would see developments in the industry, far beyond those we have ever seen before, and you the individual member would no doubt have contributed something of material value to your own company. TAPPI and your industry need you and your work.

Association Work of the Past Year

Much time during the past year has been devoted to a study of our committees and their activities. The purpose being to see what changes can be made to increase the value of committee work to the industry. TAPPI has 35 committees divided into seven major divisions. The work of some of these committees has been of great value to the Association while that of other committees have been but little. TAPPI committee work is entirely voluntary and the Association therefore must depend on selecting chairmen who have both the initiative and the will to do. I hope the time will come when we may secure the interest of the manufacturers to such an extent that they in turn will direct that time be given for committee work. This plan requires further study and development to make it workable.

During the past year your executive committee has approved the appointment of Vincent Waters to be a technical assistant to our secretary, Mr. Macdonald. Mr. Waters is engaged in a study of various related reports published by TAPPI for the purpose of preparing monographs and to make available filed technical data for committee activities. Additional technical assistance will be provided as may be required.

Finances

The financial condition of TAPPI is excellent. TAPPI is fortunate in having an able Finance Committee whose members give of their time in the supervision of expenditures, planning and preparing budgets, and advising on all finance questions that come before the Association.

Appreciation to George S. Macdonald, Publisher of the Paper Trade Journal

Appreciation is expressed to George S. Macdonald, owner and publisher of the PAPER TRADE JOURNAL for the splendid assistance and advice which he has so often rendered to TAPPI in its publication work. The PAPER TRADE JOURNAL took us under its wing when TAPPI was young in publication experience and through the generosity and help of its staff and owners we have been able to distribute TAPPI material at very low cost to the association and the industry. TAPPI expresses its appreciation to Mr. Macdonald for his advice and assistance.

Thanks to Officers and Committees of TAPPI

To the officers and committee men of TAPPI, who have been active in TAPPI work this past year, I express my great appreciation. Work of this kind is entirely a "labor of love", with compensation measured in the knowledge that your effort has helped to further the work of a great association in a great industry. TAPPI needs the help and active assistance of every member, if we as an association are to carry out the high aims of its founders.

Thanks to R. G. Macdonald and Headquarters Staff

To our competent secretary, Ronald G. Macdonald, I express my appreciation for his effort, interest and constructive work in the interests of TAPPI. The great amount of routine work involved in the publication of TAPPI material and in following committee and other activities on all possible subjects, does not permit of a one track mind. The excellence of the program at this annual meeting is ample proof of his effort and judgment. I trust that TAPPI may long have the services of our present Secretary.

Technical Objectives

Last September, at our Green Bay, Wisc. meeting, D. C. Everest, President of the American Paper and Pulp Association, made a splendid address before our association. During this address he made a strong plea to TAPPI to use its best efforts to study and find new uses for both pulp and paper. Mr. Everest emphasized the fact that the pulp and paper industry had a large excess capacity over its normal consumption requirements. These questions are of great importance today, and, as was so ably pointed out by Mr. Everest, their solution will have far reaching possibilities.

For example, consider the glass milk bottle. For this unsanitary milk container with its 15 or 20 trips into possibly unsanitary places, let us replace it with a pulp or paper container. Such a container is far

"Now there's an OPAQUE sheet"

Salesmen are encountering many comments such as this when offering the new improved lines—more opaque, whiter and brighter papers that arouse enthusiasm among paper dealers, printers and consumers.

Because the desired degree of these qualities can be obtained by CRYPTONE and ALBALITH Zinc Sulphide Pigments, which are available in a range of strengths to meet a variety of requirements, the use of these pigments is increasing.

The trade is looking for these qualities. . . . Our Technical Service Department is ready to cooperate with you on any phase of this development.

New Jersey Zinc

THE NEW JERSEY ZINC COMPANY 160 FRONT STREET, NEW YORK

ZINC SULPHIDE PIGMENTS IN PAPER

more sanitary than glass and is used only once. Paper containers would require over 300,000 tons of pulp per year equivalent to over 1,000 tons per day increase in daily pulp consumption. There are many other kinds of containers made of metal and glass that could be replaced by pulp and paper.

In the years just ahead of us we will see many new uses for pulp and paper products used in the building trade, artificial lumber more serviceable than natural lumber and fire proofed insulating material. The housewife will learn the advantages of paper products she now considers more as curiosities or luxuries.

In the graphic arts field we will see improvements in printing papers to meet the need of the rapidly increasing requirements for fine pictures, printed along with our daily and weekly newspapers and magazines.

These changes are all in the line of progress. The consumer will demand the improved product if it meets a utilitarian need. The far-sighted manufacturer must continually study to improve his product and at costs that will fit into our economic scale. The manufacturer who trails along in this procession of progress will soon drop by the wayside.

During the past twenty years we have heard much of technical control in our TAPPI meetings. Technical control as applied to a manufacturing operation is merely doing the right thing at the right time, all based on a knowledge of the real facts that enable one to understand cause and effect. Technical control has been one of the great aims of TAPPI during these past years of our development, and TAPPI has made great contributions to our knowledge and understanding of technical control.

The problem today is not less technical control but rather technical control in a broader aspect and with an added element added thereto. I refer to the fact that in these highly competitive days, we must link up the dollars as a unit of measure, with the usual units of measurements used in technical control. This means cost control to embrace this union of the dollar with technical control.

Cost control properly applied, when backed up by engineering facts, will enable us to determine what we must do to be able to operate at a profit. The goal of profit is only reached when we have charted a definite course based on properly applied cost control. The technical man must learn dollar consciousness. Manufacturing plants are built to make dollars, any other product is quite incidental. Many of our pulp and paper companies have no cost control, many do not have even the semblance of a cost system. Their knowledge of management is to sell below their competitor, because they like to think they are a little bit smarter. They sometimes wake up when the smarting becomes too much and realize the smarting is in the wrong place.

Every trade association in the paper industry is complaining of the low level of prices. You frequently hear the statement made that volume is fair to good, but that the price level is suicidal. A very large proportion of paper companies are operating at a loss. The past ten years or more has produced little or no profit for a large majority of mills. This deplorable condition may only be explained by a lack of cost systems and adequate cost control. Perhaps sometime in the future the paper industry will learn cooperation in place of cut throat competition, that too often may result in cutting one's own throat. Perhaps someday the paper industry will learn to cooperate with each other, as cooperation was learned, and is practiced, by some of the groups from whom the paper industry now purchases some of their most important supplies. Cooperation is not such a difficult dose to swallow and the spirit of cooperation dates back to antiquity. Let me give you a bit of verse on this subject entitled:

The Birth of St. Patrick

Now the first faction-fight in owld Ireland they say,
Was all on account of St. Patrick's birthday.
Some fought for the eighth—for the ninth more would die,
And who wouldn't see right, sure they blacken'd his eye.
At last both the factions so positive grew,
That each kept a birthday, so Pat then had two,
Till Father Mulcahy, who show'd them their sins,
Said "No one could have two birthdays, but a twins".

Said he, "Boys, don't be fighting for eight or for nine,
Don't be always dividin'—but sometime combine;
Combine eight with nine, and seventeen is the mark,
So let that be his birthday".—"Amen", said the clerk.
"If he wasn't a twins, sure our hist-ry will show
That, at least, he's worth any two saints that we know."
Then they all got blind drunk—which completed their bliss,
And we keep up the practice from that day to this.

If a fight loving bunch of Irishmen of County Cork and County Kerry can learn to cooperate then the paper industry should not have difficulty in learning the same lesson.

Report of the Secretary

R. G. Macdonald, the secretary of the association presented his annual report as follows:—

In 1938 the Technical Association of the Pulp and Paper Industry had a successful year in many ways.

Membership

There were 190 individual members elected in 1938. 86 resigned or were removed from the membership. On December 31, 1938, the total membership was 1707.

There were 4 corporate and 7 contributing members elected. 2 corporate members and 5 contributing members resigned. The corporate membership on December 31, 1938 was 92 and the contributing membership was 86.

The companies that became corporate members were:

Alex Cowan & Sons, Midlothian, Scotland
Wood Conversion Company, Cloquet, Minn.
Bowater's Paper Mills Ltd., Kent, England
Watervliet Paper Company, Watervliet, Mich.

The companies that became contributing members were:

American Rolling Mills, Company, Middletown, Ohio
Trimbey Machine Works, Glen Falls, N. Y.
Pulp Bleaching Corporation, E. Orange, N. J.
Stebbins Engineering and Manufacturing Co., Watertown, N. Y.
Bird Machine Company, S. Walpole, Mass.
Roots-Connersville Blower Corporation, Connersville, Ohio
Bennett Inc., Cambridge, Mass.

Necrology

The association lost through death 8 members, namely:

F. C. Broeman	J. F. Schulze
L. M. Booth	W. T. Hinckley
C. S. Hamersley	C. H. Hertz
C. F. Fromm	R. G. Voet

Special Reports on Manufacturing Problems

Throughout the year the association receives a number of inquiries on technical subjects. Most of these are responded to by the secretary with the advice of many competent members. Several of these inquiries require the advice of a large number of members. Compilations of these responses are issued as special reports. In 1938 the following special reports were issued:

Number	Title
274	Management Methods and Incentives
281	Requirements for Pulp and Paper Mill Water
282	Pulp and Paper Testing Progress
283	Power Data for Paper Mills
284	Measurement of Random Piled Pulpwood
285	Increasing Cross Grain Tensile Strength and Machine Direction Stretch
286	Maximum Temperature in Wooden Acid Storage Tanks
287	Cymene from the Sulphite Process
288	Nip Pressure of Suction Press Rolls
289	Paper Mill Quality Control and Inspection
290 (C7)	Sulphur Consumption in News Grade Sulphite Mills
291	Scaly Material

Employment

A growing number of companies are asking the secretary to obtain competent employees such as engineers, chemists, mill executives and superintendents. In 1938 a considerable number of such positions were filled. Members needing employment or hearing of jobs open should notify the secretary as soon as possible.

Fall Convention

The fall meeting of the association was held at Green Bay, Wis. with the Hotel Northland as headquarters on September 8-10, 1938, with an attendance of about 700. A detailed report of this meeting appeared in the PAPER TRADE JOURNAL of September 15, 1938. A. B. Hansen of the Northern Paper Mills was general chairman and with his committee did an excellent job.

Optical Properties Seminar

From July 11 to 15, 1938, thirteen representatives of the Technical Association attended a seminar held at the Institute of Paper Chemistry on Color and Optical Properties of Paper.

Research Promotion

Two grants were made for the financing of fundamental research. One was for $600 for the study of holocellulose under the direction of G. J. Ritter of the Forest Products Laboratory, Madison, Wis. and another for $1,000 for the study of the relation of lignin content to the strength of paper and pressed boards under the direction of E. C. Jahn of the New York State College of Forestry, Syracuse, N. Y. Application for grants should be made through association committees and divisions to John L. Parsons, Chairman, TAPPI Research Promotion Committee, Hammermill Paper Company, Erie, Pa.

Publications

The regular publications of the association published in 1938 were as follows: Technical Association Papers (580 pages) published in June; Bibliography of Papermaking (March); Year Book (September); Technical Section, Paper Trade Journal (weekly); and additions to TAPPI Standards. The Lockwood Journal contributed financially to Technical Association Papers and throughout the year Henry J. Berger, Editor of the Paper Trade Journal assisted the Secretary in the preparation of material for publication.

Volume IV of the Manufacture of Pulp and Paper was published by the McGraw-Hill Book Company during the past year.

Local Sections

One new charter was granted to a local section in 1938. This was to the Empire State Section which is made up largely of members located in the northern part of New York State.

All of the sections had a successful year, most of them holding monthly meetings.

The Pacific Section initiated a plan whereby a prize is offered to one of its members for preparing a meritorious paper for presentation at one of its meetings.

Committees and Divisions

The committees made an excellent response in preparing for the annual meeting by obtaining valuable papers.

During the past year there was a reorganization of some of the divisions, the more important details being as follows:

The Management and Raw Materials Divisions were discontinued and an Industrial Division organized. This division is made up of the following committees: Fibrous Raw Materials, C. W. Boyce, American Paper and Pulp Association, chairman; Non-Fibrous Raw Materials, H. H. Hanson, W. C. Hamilton & Sons, chairman; Industrial Engineering, L. T. Stevenson, chairman and Waste, L. K. Burnett, Robert Gair Company, chairman. B. M. Thomas of the Container Corporation of America was general chairman and H. P. Cannon, vice chairman.

The Personnel Management, Production Management, Finance and Economics and Marketing Methods Committees were discontinued and the Patents Committee was transferred to the Research Development Division.

In the Engineering Division, W. G. MacNaughton, chairman, the Equipment Committee was discontinued and a Water Committee established. L. M. Booth of the Booth Chemical Company was appointed chairman but was lost through death and succeeded by L. B. Miller of Keasby & Mattison as chairman.

The Operating Division was discontinued and replaced by the Pulp Manufacturing and the Paper Manufacturing Divisions.

W. F. Gillespie of the Gaylord Container Corporation was appointed general chairman and Vance P. Edwardes of the International Paper Company, vice chairman of the Pulp Manufacturing Division.

The Preparation of Fibrous Materials Committee was discontinued. Paul Hodges of the Brunswick Pulp and Paper Company succeeded H. R. Murdock of the Champion Paper and Fibre Company as chairman of the Alkaline Pulping Committee. Charles Carpenter was appointed chairman of the newly formed Pulp Purification Committee.

G. Lamont Bidwell, Jr. of the Riegel Paper Corporation was appointed general chairman of the Paper Manufacturing Division. He was succeeded by Ward Harrison of the same company as chairman of the Stuff Preparation Committee. The Paper Manufacture and the Finishing Committees were discontinued and replaced by the Forming and Finishing Committee of which E. P. Ingalls of the S. D. Warren Company is chairman.

In the Research Development Division, C. E. Curran, Forest Products Laboratory, chairman, Harry Weston of the *Paper Industry* succeeded B. T. McBain as chairman of the History and Biography Committee. The Paper Use Requirements Committee was discontinued and the Patents Committee was transferred to this division from the Industrial Division.

In the Converting and Consuming Division, A. W. Nickerson, general chairman, F. W. Egan of the John Waldron Corporation succeeded J. J. O'Connor of the Mead Corporation as chairman and J. F. Halladay of the Container Corporation of America succeeded Charles Clarkson (deceased) as chairman.

In the Testing Division, H. W. Morgan, Munising Paper Company, chairman, F. W. Brainerd of the Scott Paper Company succeeded J. F. Spauling of the Oxford Paper Company as chairman.

In the general committees there were a few changes. The Educational Cooperation Committee became the Research Promotion Committee, J. L. Parsons, Hammermill Paper Company, chairman. The Permanence and Durability, Public Relations and Monograph Committees were discontinued.

J. N. Stephenson Is Presented TAPPI Medal

J. Newell Stephenson, editor of the *Canadian Pulp and Paper Magazine of Canada* and editor of the Manufacture of Pulp and Papers in five volumes was presented with the TAPPI medal for his outstanding contribution to the technical advancement of the industry at the annual luncheon of the Technical Association of the Pulp and Paper Industry at the Roosevelt Hotel, Thursday. The presentation was made by George Carruthers, president of the Interlake Tissue Mills Company, Ltd., Merritton, Ont., and chairman of the Joint Textbook Committee of the Paper Industry of the United States and Canada under whose direction has been published the five volumes of the Manufacture of Pulp and Paper. Mr. Carruthers spoke as follows:

Presentation by Mr. Carruthers

It gives me great pleasure to have the privilege and the honor of presenting the 1939 TAPPI Medal to J. N. Stephenson, our textbook editor. This medal, as you are all aware, is being awarded to Mr. Stephenson for his outstanding services in the technical advancement of the pulp and paper industry. The members of the Joint Textbook Committee, the majority of whom have been associated with Mr. Stephenson for over 20 years in carrying on this educational work, believe that the pulp and paper industry is very fortunate in having, as editor, a man who is so well and favorably known to nearly all of the outstanding paper mill managers and paper technologists in the industry. Due, largely, to the generous cooperation of these men, Mr. Stephenson has been able to keep in touch with the progress of the various branches of our industry, and with this connection, and his personal knowledge of pulp and paper manufacture, he has developed texts which have proved to be of great technical value to our pulp and paper makers.

May I be permitted to say that we, of the Joint Textbook Committee, know, as few others can know, the amount of hard work, tact and sound judgment which Mr. Stephenson has applied to this work, with the result that we have one of the finest series of industrial texts in existence. We have always placed a high value on Mr. Stephenson's services to the industry, and it was with great satisfaction that we learned that TAPPI had decided to formally acknowledge his services by awarding to him their 1939 Medal, a satisfaction which, I am sure, is shared by all technically informed men in the pulp and paper industry of this continent.

Mr. Chairman and gentlemen, much more might be said concerning Mr. Stephenson and his valuable work. I believe, however, that further comments by me, at this time, would be futile. Therefore, on behalf of the Technical Association of the Pulp and Paper Industry, I now present to Mr. Stephenson this medal. I do so with great pleasure for, like the members of TAPPI, I regard you, Mr. Stephenson, as a man who is worthy of the honor. Please accept my congratulations!

Response by Mr. Stephenson

When your secretary, Mr. Macdonald, let the cat out of the bag and told me of the surprise that was to be sprung on me today, he warned me to prepare a few extemporaneous remarks and suggested that five minutes would be sufficient.

Frankly, gentlemen, it does not seem fair to receive such a great honor for something that so many others have made possible. Nevertheless, the award of this medal is very greatly appreciated and makes me very happy to have such evidence of your approval of my efforts during the past twenty-three years in the field of education in the technology of pulp and paper making. Those years have been made very pleasant through the lasting friendships of fellow-workers and students, and the tasks that have fallen to me have been lightened by the assistance of many willing helpers. Nobody ever got more enjoyment out of his work than I have had, and I want to name some of those who have made it so. This will give you a picture of some of the personalities and experiences behind the textbooks.

The story begins when as a boy just out of high school I started as third hand at the B. D. Rising paper mills, where the superintendent, R. O. Harper, took the trouble to show an interest in me and eventually to encourage me to take a course at the Massachusetts Institute of Technology. After graduating

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I taught at Rose Polytechnic Institute, where John White was a great inspiration as a noble teacher.

Then, at the University of Maine, with Ralph H. McKee and Guy Durgin, it was my privilege to help organize the first American school of paper making. We had a lot of fun as well as hard work, as early students can testify, pouring concrete and setting up machinery. Two of those students, Paul Bray and Earl Libby now head the schools of paper making at Maine and Syracuse.

Then, in 1916, my work on Abstracts of Paper Literature took me to Montreal to confer with the late O. F. Bryant of the Forest Products Laboratories. J. J. Harpell convinced me that there was a bigger field for education—and at better pay—as editor of *Pulp and Paper Magazine of Canada*. So my new job started in 1917. My association with my good friend, George Carruthers started that very month, when T. L. Crossley put us on the Technical Section Committee on Education.

The committee evolved a couple of educational ideas, and classes in science, drawing, etc., were started in several paper mill towns. The next year, the need of a textbook on paper making was evident and we Canadians suggested a joint meeting with the corresponding committee of TAPPI. Including interested mill executives, forty of us met in September 1918 at Buffalo, N. Y. There and then was born the Joint Executive Committee of the Vocational Education Committees of the United States and Canada. It is now the Joint Textbook Committee, and George Carruthers has been chairman and R. S. Kellogg secretary from that day, enabling early friendships to be more firmly connected. The other members appointed were George Williamson, T. L. Crossley, and C. P. Winslow, who very soon resigned and was replaced by R. S. Hatch. That committee has functioned for twenty consecutive years, and is still going strong. The meeting decided to prepare, on behalf of the industry, a textbook that would provide a student with instruction in the technology of pulp and paper making and the prerequisite elementary mathematics and science.

At the Buffalo meeting the committee induced me to organize and edit the work, which we thought would make four volumes and for the preparation of which we thought $30,000 would be sufficient. The Canadians were to raise one-third and the Americans the remainder. That was done, and then some. Five volumes became necessary and costs went up. The committee raised $57,000 and had a bit left from the first edition to provide a nest egg for a revision. The first edition was completed in January 1925, the second edition (of Vols. 3, 4, 5) in January 1929, the third edition in January 1939. The committee has spent $78,000 and has $3,000 left! The magic wand has been royalties from the sale of over 30,000 books. The textbook has been translated and a French edition published in Canada.

Such an accomplishment was possible, of course, only by having a sound plan and working hard. Actually more than a hundred friends of the enterprise cooperated with editorial contributions, not to forget all those who contributed the necessary funds. But, besides the ever-faithful and helpful Textbook Committee, there are four men to whom the industry owes a great deal. T. J. Foster, founder of the International Correspondence Schools, gave invaluable advice on the planning and starting of our project. Through him we were able to get the services of J. J. Clark, formerly dean of the I. C. S., and Joseph Sanzero, who drew almost every diagram in the five volumes. Mr. Clark has not only prepared every line of manuscript for the printer, and read every galley and page proof, but also wrote the sections on mathematics and mechanics. Since 1922, Mr. Clark has been vice-principal of the Institute of Industrial Arts, and has given helpful advice and encouragement to a thousand students along with the thousands of examinations he has corrected. His recent death at the age of 73 is a great loss, both personally and to our work. And then to J. J. Harpell, formerly publisher of the *Pulp and Paper Magazine,* the industry should be grateful for many courtesies and much practical assistance and advice. And there has never been a serious dispute with the publishers, The McGraw-Hill Book Company. I must admit using dictator tactics on one or two occasions, and I ask pardon of those whose feelings may have been unintentionally hurt at the time.

It has been very satisfactory to be able, with the help of so many others, to pass on to the coming generation of pulp and paper makers some of the benefits that have come to me. Your generous recognition and the gracious remarks of Mr. Carruthers are indeed greatly appreciated.

In closing, let me say that the Textbook Committee has not given the industry a hobby horse just to be played with, but a piece of valuable equipment that can be used to great advantage. You have only to take notice of a few ambitious intelligent young men in each of your mills and encourage them to study the technology of pulp and paper making. They don't have to quit their jobs and spend a lot of money and several years in college. Home study courses are available. There are many serious, thoughtful young men in your plants who will be your future foremen, superintendents, salesmen and executives—and better ones than you can get from outside—if you will but give more thought to this phase of management and take more interest in their progress. For what ye sow, that shall ye also reap.

Guy H. Nelson Dead

Guy Herbert Nelson, 66, president of the B. F. Nelson Manufacturing Company of Minneapolis, Minn., died February 10 after a long illness, at his home, 57 Groveland terrace. Mr. Nelson was born April 16, 1872, the son of Benjamin Franklin Nelson, pioneer leader in business and industry, and Martha Ross Nelson.

In 1895, he married Miss Emma Bobendrier and shortly afterwards moved to Seattle, where he operated a shingle mill. Their two sons, Earl P. and Eugene R. Nelson, are dead. Mrs. Nelson also died and Mr. Nelson married again.

He was associated with his father in the B. F. Nelson paper products and roofing business and in lumber manufacturing, except during the year on the Pacific coast. From 1907 to 1917, he lived in Walker, Minn., where he managed the Leech Lake Lumber Company. Since then, he had been active in the B. F. Nelson organization and had been president since 1930.

Mr. Nelson was active in public affairs and community and welfare projects. He played a leading part in founding and developing the B. F. Nelson Memorial house, a social center established in memory of his father. Mr. Nelson was a member of Cataract lodge and the Shrine in Masonic orders.

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Pliolite—A Coating Material for Paper*

By H. R. Thies [1]

Abstract

The structure and x-ray diffraction patterns of various rubber derivatives are given. The adaptation of Pliolite, a cyclized rubber derivative to paper coating is discussed. Its performance, when applied to the surface of paper from solution, is given. Mixtures of Pliolite and wax, applied from hot coatings, are also discussed.

There has been an ever-increasing tendency during the last several years to broaden the utilization of papers of various types by altering their physical characteristics with various functional coating materials. *(1)* One of the more recent developments in this field is the utilization of a cyclized derivative of rubber called Pliolite for paper coatings of various types. *(2)* It is the purpose of this paper to describe Pliolite and its utilization in these coatings. It has been necessary to effect some rather remarkable changes in the rubber molecule in order to make it adaptable to the numerous requirements which are placed upon a paper coating material and the history of this development is of interest.

For many years the attention of chemists has been drawn to the consideration of rubber as a raw material upon which to effect transformations into substances possessing the properties of resins. Nature provides the hydrocarbon (C_5H_8) in a variety of forms of which rubber is the most common. Balata and gutta purcha empirically the same as rubber closely resemble resins in being thermoplastic. In all these forms of the hydrocarbon (C_5H_8), the simple building unit nature has chosen is isoprene:

By some unknown process of nature hydrocarbons

$$H_2C{=}\overset{\displaystyle CH_3}{\overset{|}{C}}{-}CH{=}CH_2$$

of high molecular weight are built from this unit. Such hydrocarbons, possessing relatively fewer double bonds, are therefore less unsaturated than in isoprene. In rubber there exists one double bond for each C_5H_8 group but up to the present time the number and the manner in which these groups are united is not precisely known. The most widely accepted chemical symbol for the rubber hydrocarbon, together with x-ray diffraction patterns of unstretched and stretched unvulcanized rubber, is shown in Fig. 1.

$$\text{Rubber} = \left(\begin{array}{c} H \\ | \\ -C- \\ | \\ H \end{array} \begin{array}{c} CH_3 \\ | \\ -C{=}CH- \end{array} \begin{array}{c} H \\ | \\ -C- \\ | \\ H \end{array} \right)_x$$

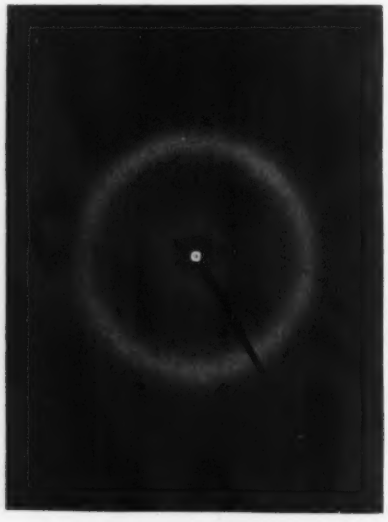
The chemists who specialize on rubber work have not as yet decided whether this rubber molecule exists as a long chain or a large ring type structure. *(3)* Therefore, in discussing this structure in this paper we will endeavor to keep our chemical formulations expressed in the form of as few units of this C_5H_8 group as is possible for the sake of simplicity.

For those interested in the performance of the rubber molecule as such, the following tabulation gives the outstanding reactions of rubber other than its vulcanization with sulphur:

TABLE OF RUBBER REACTIONS

1. Rubber + hydrogen → C_5H_{10}.
2. Rubber + halogen → $C_5H_8Cl_2$ or $C_5H_4Cl_4$.
3. Rubber + hydrogen halides → C_5H_9Cl.
4. Rubber + organic halide → Thermoplastic amorphous solid.
5. Rubber + oxychlorides → $C_5H_8CrO_2Cl_2$.
6. Rubber + oxide of nitrogen → Rubber nitrosite compounds.
7. Rubber + organosulphonic acids → Thermoprene.
8. Rubber + stannic chloride or chlorostannic acid → Pliolite.

Perhaps the most interesting reactions for discussion would be those dealing with commercially exploited products. We show the chemist's concept together with x-ray pictures of the most widely known and most widely used rubber products (Fig. 2).



Unvulcanized Rubber (Unstretched)

Raw Rubber (Stretched) 800% Elongation.

FIG. 1.

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Roosevelt Hotel, New York, N. Y., Feb. 20-23, 1939.

[1] Asst. Manager, Research and New Products Development Department, The Goodyear Tire and Rubber Company, Akron, Ohio.

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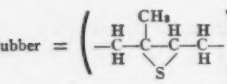
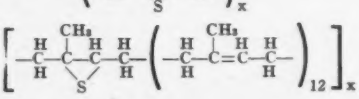
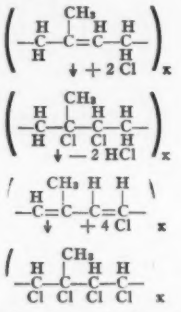


Vulcanized Rubber =



This first formulation is representative of ebonite or hard rubber and is one of the oldest known rubber compounds. The second formulation shown is given in order to contrast the formulae of the product combining 32 per cent sulphur with the rubber molecule to that combining 4-6 per cent. In this last formulation it is apparent that the double bond which is so reactive in the rubber molecule is not saturated in each isoprene unit and this is a conception which the writer has of how the molecules of rubber look as you see them evidenced in such things as inner tubes, tire treads, and the like.

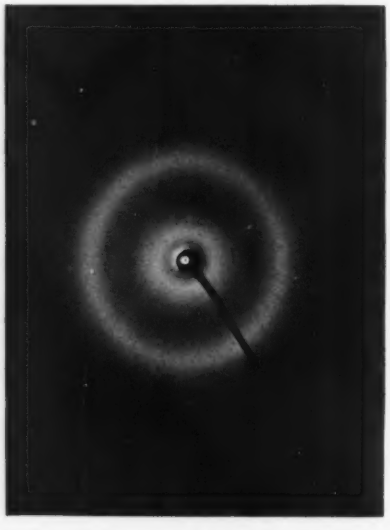
Another quite widely used commercial product of rubber is rubber chloride. *(4)* The chemistry involving rubber chloride together with an x-ray photograph (Fig. 3), is given below:



In examining this formulation it is well to note that the conception put forth is that the rubber chloride molecule is a completely saturated molecule and that, in addition to having the double bond saturated with chlorine, substitution of two hydrogen atoms has taken place. It should also be mentioned that the actual analysis of chlorine present in rubber chloride is not as great as the theory calls for, due to the fact that crude rubber itself is composed of

FIG. 3.
Rubber Chloride

two materials. One form is called the sol form and the other form is known as the gel form. *(5)* Simply stated, this means that when crude rubber is extracted with a solution of petroleum ether or ethyl ether one obtains a very soluble fraction amounting to 75 or 80 per cent of the crude rubber. This material is the sol form and is more reactive insofar as saturation is concerned than is the gel form. It theoretically corresponds to the C_5H_8 grouping. The remaining fraction, which is unextractable and remains after treating with solvents such as mentioned, is known as the gel form. Chemically, its unsaturation is considerably less than that of the sol form. Therefore, in calculating theoretical saturation it is quite usually the case that the theoretical saturation will be somewhat higher than the actual saturation found. In the case of rubber chloride, for example, the figures show 68 per cent by theory; by actual practice this comes out approximately 63-65 per cent chlorine combined when the reaction is favorable.



Ebonite

Vulcanized Rubber (Unstretched)

FIG. 2.

Another very interesting product is rubber hydrochloride. *(6)* (Fig. 4). This material, as can be seen,

Pliofilm = $\left(\begin{array}{cccc} H & CH_3 & H & H \\ -C- & -C- & -C- & -C- \\ H & Cl & H & H \end{array} \right)_x$

is the rubber molecule wherein the double bonds have been saturated with hydrochloric acid. Physically, this product is quite dissimilar to the well-known rubber derivatives in that it gives a flexible, tough, transparent, water resistant and grease resistant film which is finding wide adaptation both as a fabric and as a packaging material under the name of Pliofilm.

If rubber is treated with such reagents as stannic chloride or chlorostannic acid, a product is formed which has the following structural formula *(7)* (Fig. 5):

Pliolite = $\left(\begin{array}{ccccccccccc} & CH_3 & & H & H & CH_3 & & & & & \\ H & | & H & | & | & | & H & H & & & \\ -C- & -C- & -C- & -C- & -C- & -C= & C- & -C- & & & \\ H & | & | & H & H & | & & H & & & \\ H & | & | & H & H & | & & H & & & \\ -C- & -C- & -C- & -C- & -C- & -C= & C- & -C- & & & \\ H & | & H & H & H & | & H & H & & & \\ & CH_3 & & & & CH_3 & & & & & \end{array} \right)_x$

As can be seen this material is essentially different from rubber chloride or rubber hydrochloride type molecule in that it apparently has the ring structure formed between two molecules of the simple rubber hydrocarbon. This ring structure is then attached to two more molecules of the rubber hydrocarbon in which the double bond has not been saturated. Physically, this rubber derivative is a thermoplastic resinous type of material soluble in both aromatic and petroleum type hydrocarbons as well as chlorinated hydrocarbons and terpenes. If a comparison, however, is made with the raw rubber it is seen that solutions of Pliolite are entirely different in their behavior.

For a long time it has been thought that rubber and mixtures of rubber and paraffin had desirable waterproofing qualities which could be utilized to advantage on paper. *(8)* However, due to the fact that rubber, as such, is difficult to handle as a spreading medium and to the practical difficulty of getting it into non-tacky, thin films and obtaining transparency, it has only recently been widely used in the paper field. *(12)* It has had extensive use in the waterproofing and coating of fabric. With the advent of Pliolite it is possible to utilize a derivative of rubber, which shows a decided improvement over rubber itself, in the waterproofing and moisture vaporproofing characteristics and yet does away with a number of disadvantages of rubber. Pliolite can be handled in various solvents in fairly high concentration and dries to a transparent, clear, glossy, non-tacky film which is highly resistant to water and the passage of moisture vapor.

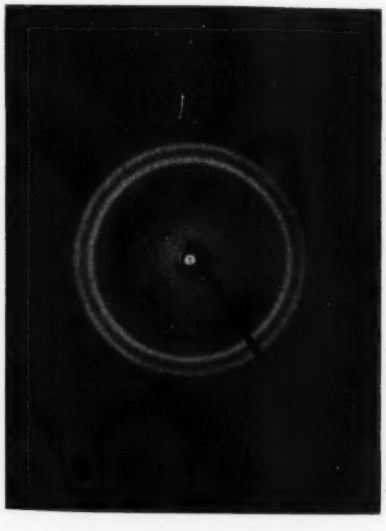


FIG. 4.
Rubber Hydrochloride

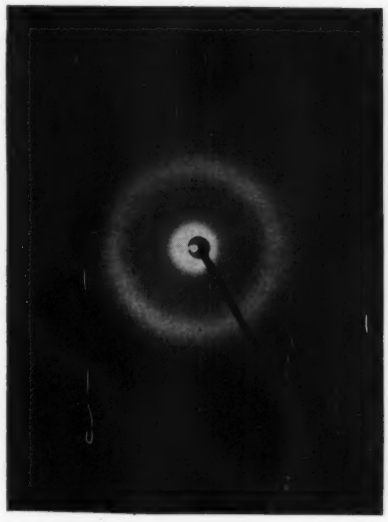


FIG. 5.
Pliolite

Manufacture of Pliolite

In manufacturing Pliolite, it has been found necessary to use, as a starting material, a very high-grade of low protein content rubber. A number of sources were studied to determine the type which would yield a superior product and a low protein content rubber was selected as being the most desirable. This rubber is put into solution in a solvent and when this is accomplished the characteristic heavy, viscous, nondrying cement is made. This rubber cement is then placed in a jacketed reactor equipped with a reflux and is heated for a period of time with the catalyst. During this heating period an enormous reduction in the viscosity of the solution is experienced and a physical change is affected from the usual rubber into the resinous state. *(9)* It is, of course, evident that the physical characteristics of the product can be altered depending upon the time which the above reaction is allowed to proceed. A family of resins is obtained, possessing distortion points varying from 25 to 105 deg. C. These different types of Pliolite resin also yield different viscosities, when put into solution the resins which have the lower distortion point giving the higher solution viscosities.

The resin is recovered from the solvent as a finely divided powder. This powder is vacuum dried and is commercially known as Pliolite resin powder. This material, if used in solvents, appears to have the sol and gel phase of the parent rubber; therefore, for utilization in solvent it is necessary to mill this powder to yield Pliolite resin. This milling operation further reduces the solution viscosity. If films deposited from solutions are observed, they are found to be glossy, non-tacky, heat sealing and clearly transparent. It is evident, therefore, that when using Pliolite resin in solution the milled variety is desired.

If admixtures of Pliolite and wax are desired, where wax is to predominate, it has been found that the Pliolite resin-powder very readily dissolves in most of the common waxes by the process of heating the wax and adding the unmilled resin.

Applications—Solvents

In discussing the application of these two products to the paper field we will first discuss the application of coatings of Pliolite to the paper surfaces by means of solutions of Pliolite in various solvents. The table given below shows the solvent characteristics of Pliolite resin together with the drying times for the deposited films from the various solvents.

RELATIVE VISCOSITY OF 20 PER CENT BY WEIGHT OF PLIOLITE IN VARIOUS SOLVENTS

Solvent	Ford Cup No. 4 Orifice Relative Visc. at 73-75 deg. F.
High test gasoline Sp. Gr. .705, Viscosity reading 26.5	1.00
Skellysolve "D"	1.13
Skellysolve "C"	1.21
Shell Tolu. Sol.	1.245
Lacolene	1.32
Trolnoil	1.395
Skellysolve "E"	1.395
Trolnoil	1.395
Xylene	1.68
Benzene	1.70
Solvesso No. 2	1.925
Varnish makers naphtha	2.0
Shell No. 8192	2.19
Union Arom. No. 20	2.26
Amsco Code No. 148-92	2.34
Varnolene	2.83
Dipentine	2.83
Union Arom. No. 40	4.26
Kerosene	4.53
Solvesso No. 3	5.02
Turpentine	6.0
Carbon tetrachloride	35.1

DRYING TIME AT 75-80 DEG. F. R.H. 23-30 PER CENT

Solvent	Film Spread .001-inch thick, Drying Time, Min.
Benzene	1.5
Shell toluene sol.	2.75
High test Gasoline, Sp. Gr. .705	3.0
Skellysolve "C"	3.0
Skellysolve "D"	3.25
Lacolene	3.75
Trolnoil	4.5
Carbon tetrachloride	4.5
Toluene	4.75
Skellysolve "E"	5.25
Xylene	13.50
Turpentine	28.5
Amsco Code No. 148-92	37.0
Solvesso No. 2	38.5
Union Arom. No. 20.	49.0
Varnish makers naphtha	53.0
Dipentine	60.0
Shell No. 8192	65.0
Varnolene	96.0
Arom. No. 40	212.0
Solvesso No.3	300.0
Kerosene	1530.0

Moisture Vaporproof Paper Coatings

In making up a typical paper coating the proper solvent is selected to give the desired drying time and viscosity. A solution of Pliolite in this solvent is then made together with the required plasticizing agents and other specific modifying ingredients. This solution is then applied to the surface of the paper by any one of the well-known methods involving coating the paper and removal of the solvent.

Experience and the literature *(10)* has shown that various papers give widely different results as to the amount of coating required to get a given moisture vapor transfer rate. As a rule, the more impervious the surface and the less porous the paper the smaller the amount of coating required. These facts are illustrated in Fig. 6 showing the moisture vapor transfer rate for glassine paper and for a typical coated label stock paper with various weights of coating.

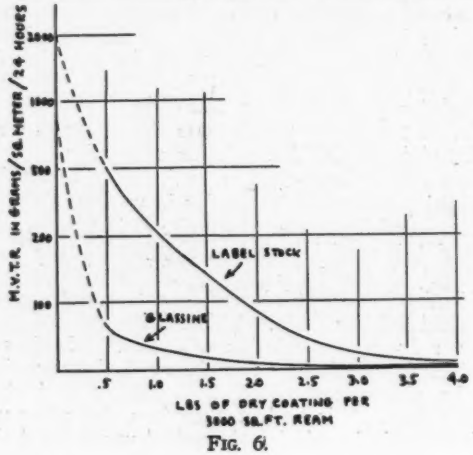


FIG. 6.

It is equally true that the packaging of different products in a moisture vaporproof paper package requires different coating weights and different moisture vapor diffusion characteristics. In our work on moisture vapor-proofness we determined the moisture vapor transfer rate by using the paper as a permeable membrane to seal water in a closed container. *(11)* The membrane is sealed to the container by the use of beeswax and the container is placed in an air circulating oven at low humidity and 40 deg. C. temperature. The weight of moisture vapor going through the paper membrane is determined by weight loss. This weight is then calculated to moisture vapor transfer rate or m.v.t.r. per square meter per 24 hours.

The range of requirements imposed upon a so-called moisture vaporproof paper may vary from 2 grams per square meter per 24 hours to 100 grams per square meter per 24 hours, depending on whether the product which it is to protect has a greater or lesser tendency to pick up moisture vapor. The requirements necessary are usually determined by actual packaging experiments and then these requirements are laid down to the paper coater in a specification as to the amount of solids required for a given area of paper.

A number of other qualifications are placed on a satisfactory coating material such as:—

(1) Anchorage. For a coating to be satisfactory the adhesion of the coating to the paper surface must be sufficiently strong so that the coating will not come loose from the surface of the paper. In cases where the coating is to be subsequently heat sealed in order to make a union, the anchorage to the paper is required to be even greater. Commercially, Pliolite has no difficulty in giving heat seal anchorages which are sufficiently strong to tear the paper upon which the coating is applied.

(2) Heat Sealability. In some cases coatings are required to be of such nature that they can be heat sealed with a hot iron at a temperature of 275-350 degrees and in other cases no heat sealing is required. In the Pliolite coatings the degree of heat seal is dependent upon the temperature at which the seal is made, the higher the temperature the tighter the seal.

(3) Slippage. For some uses the ability of the coating to slip over hot surfaces is desirable; in other cases this characteristic is of no interest. However, in certain packaging operations slippage must be present and this characteristic is generally accomplished by the addition of proper ingredients to the coating formulation.

(4) Gloss. Various degrees of gloss are required for paper coatings for various purposes. Where the coating is to be applied over printing, such as on labels, a very high degree of gloss is desirable. In other applications, such as coating parchment paper, kraft paper, and similar materials, the degree of gloss is not important. These characteristics of the coating are also handled in the formulation of the solid material.

(5) Blocking. It is imperative that coated paper be free from blocking characteristics at temperatures up to 130 deg. F. Most Pliolite moisture vaporproof films are entirely free from trouble at this temperature and in most cases require no specific attention

to the blocking conditions. However, here again proper formulation is necessary.

(6) Stability. If a moisture vaporproof film is applied to paper it is highly desirable that this film be effective in its moisture vapor prevention, both when new and when of considerable age. Production experience as well as laboratory examination has shown that films of Pliolite deposited on a paper of a thickness no greater than 0.0001—inch have maintained their moisture vaporproofness at a constant rate over a period of two and a half years' time. Millions of packages have been put on the market with the contents protected from moisture vapor pickup by paper which has been coated with moisture vaporproof Pliolite coatings.

(7) Low Air Permeability. It has been quite generally found that for a moisture vaporproof coating to be effective it is necessary that it have low permeability to gas, particularly air, and in some cases carbon dioxide. The following table shows the efficiency of a properly coated glassine paper in preventing diffusion of both air and carbon dioxide.

	Air Diffusion cc/sq. meter/24 hrs.	CO_2 Diffusion cc/sq. meter/24 hrs.
25-lb. glassine	9700 cc.	8350
Same glassine coated both sides with Pliolite formulation R-116-006—1.5 lbs. solids per ream	50	1700
Moistureproof regenerated cellulose .001 thick	130	3370
Cellulose acetate	60	8260

The above determinations were made using the paper or film as a membrane with a pressure differential of two pounds per square inch, and the figures give averages of at least twenty determinations for each value shown. *(12)*

(8) M.V.T.R. Efficiency. It is realized that the coating of paper adds to the cost of the finished sheet. Therefore, the efficiency of the coating which is to be applied should be high so that as little of it as is necessary to do the job is used. Data are available both from our laboratories and from the laboratories of the consumers showing that the efficiency of a Pliolite coating based on the weight necessary to accomplish a given moisture vapor transfer rate is the highest of any of the well-known coatings deposited from solution.

As can be readily appreciated, the above outlined requirements for a coating material have to be taken care of by special consideration in the formulation of the material to be applied. It is highly desirable for anyone contemplating coating paper, for the purpose of moisture vaporproofing this paper, to be fully aware of the above facts. It is also necessary that the person who is to supply the coating for the paper be given a complete history as to the type of paper, the type of surface on which the coating is to be applied and the requirements that are expected of the finished sheet.

Pliowax

The second field open to the utilization of Pliolite resins is in the field of hot melt coatings. The most widely used mixtures in this field are mixtures of

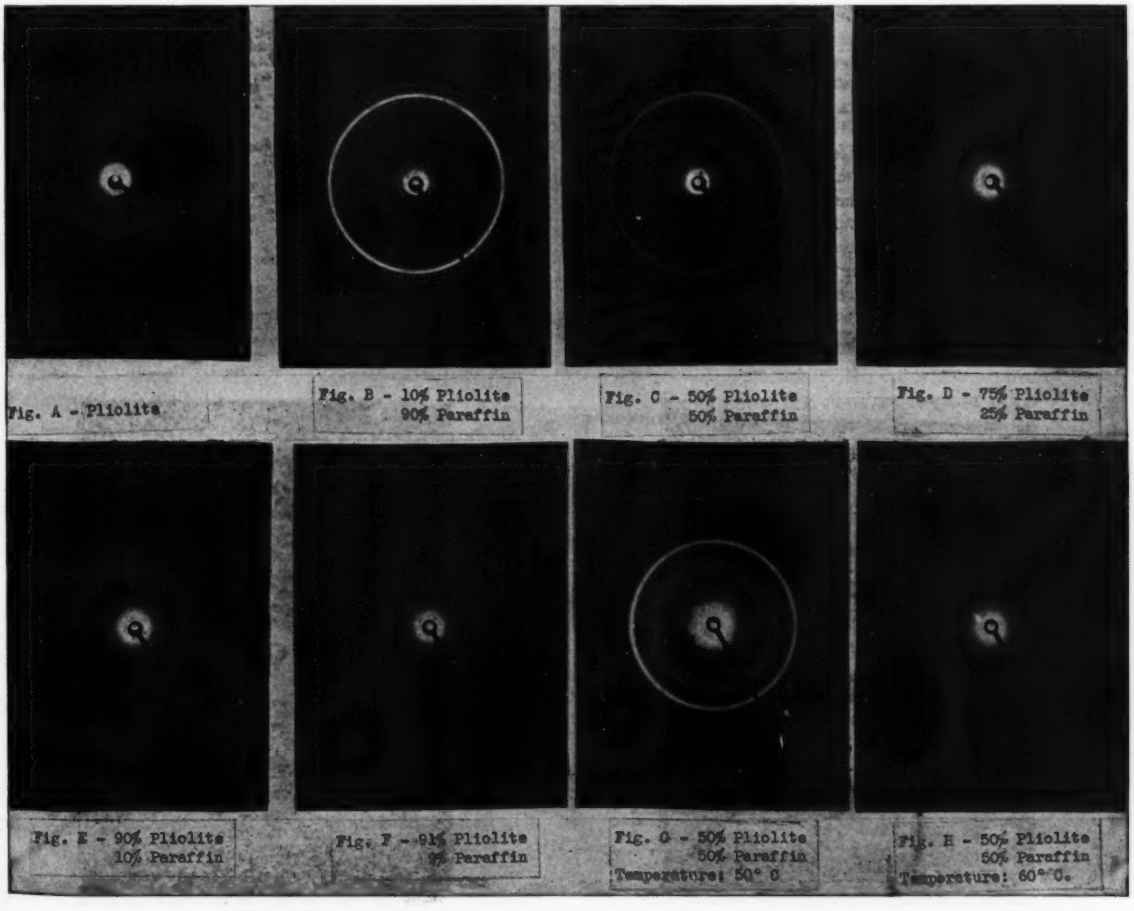


Fig. A - Pliolite
Fig. B - 10% Pliolite 90% Paraffin
Fig. C - 50% Pliolite 50% Paraffin
Fig. D - 75% Pliolite 25% Paraffin
Fig. E - 90% Pliolite 10% Paraffin
Fig. F - 91% Pliolite 9% Paraffin
Fig. G - 50% Pliolite 50% Paraffin Temperature: 50° C
Fig. H - 50% Pliolite 50% Paraffin Temperature: 60° C.

FIG. 7.

Pliolite resin unmilled with various waxes. These mixtures are familiarly known to the trade as Pliowax. It has been found that the addition of Pliolite to waxes such as paraffin wax and ceresin materially increases the toughness of the wax, improves its gloss and to a very great degree materially strengthens the heat seal obtained when films of these mixtures are compared with films of the wax alone.

In mixtures of this type the addition of Pliolite resin unmilled to a 135 degree melting point paraffin will increase its melting point approximately three degrees for every 5 per cent of Pliolite added. The viscosity of the wax is also increased so that more wax can be held on smooth, slick surfaces when Pliolite is present than with the wax alone. A large amount of data has indicated better m.v.t.r. figures for Pliowax coated paper than for paper coated with wax alone, although it is granted that an integral coating of paraffin yields a very moisture vaporproof membrane. *(13)* We feel that the function of Pliolite in this particular instance is to strengthen the wax film so that it is not susceptible to cracking or breaking under small distortions when handled.

We have prepared a series of x-ray diffraction patterns of various Pliolite-wax mixtures running in range from 100 per cent Pliolite to 10 Pliolite-90 Paraffin. We have also taken x-ray diffraction patterns of a mixture of equal parts of Pliolite and paraffin at temperatures of 50 to 60 deg. C. These pictures are given in Fig. 7.

From the above it is evident that at room temperature a true solution of paraffin in Pliolite occurs between 9 and 10 per cent. Figure E shows a trace of the paraffin ring while Figure F shows the paraffin ring to be absent and indicates that a true solution of the wax and Pliolite has been accomplished. It should also be noted that a film containing 90 Pliolite and 10 paraffin is optically clear even though the x-ray pattern does show the crystalline paraffin ring to be present. It has also been found that the solubility of wax in Pliolite increases with the temperature up to the melting point of the wax when they both become mutually soluble in all proportions. The x-ray diffraction patterns C, D and E show the gain in intensity of the Pliolite ring with respect to the paraffin pattern as the proportion of Pliolite is increased. The structure in each case is that of a homogeneous mixture, but not that of a true solution. Figures G and H illustrate the effect of a higher temperature on the structure of a 50 per cent composition. At the lower temperature, five degrees below the melting point of the wax, the paraffin rings are broadened and the less intense ones are not registered. At 60 deg. C. a structure characteristic of a true solution is shown by the single broad halo.

It has also been observed in the practical applications of Pliowax films that in order to obtain a high degree of gloss it was necessary to rapidly quench the films just as in working with wax. (13) If this quenching operation was not done a dull film was obtained. The x-ray diffraction patterns (Fig. 8) show a dull and glossy Pliowax surface.

As can be seen, so far as the diffraction pattern is concerned there is no difference between these two types of films, the difference must therefore be in the orientation of the crystals.

Summary

It is felt that each type of coating has its particular function to perform. When highly moisture proof, strongly heat sealing, transparent and glossy coatings are desired a coating from solution is indicated. Where transparency is not a factor and some gloss or heat seal strength can be sacrificed the Pliowax type of coating can be employed, applied either as a hot melt or from solution.

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All x-ray diffraction patterns by S. D. Gehman and J. E. Field, Research Department, Goodyear Tire & Rubber Co.

100 Pliolite, 75 Wax, Unquenched, Dull

100 Pliolite, 75 Wax, Quenched, Glossy

FIG. 8.

The Noblewood Mill*

By James Coghill[1]

Abstract

A description of the Noblewood mill, a machine for the continuous treatment of paper pulp based upon the principle of fluid shear.

The Noblewood mill represents a large scale development of the colloid mill principle of high speed rubbing or "fluid shear." The machine is built in such a way as to apply this well known principle to the treatment of large volumes of stock, with automatic adjustment for microscopic wear of the working parts and with positive elimination from the working areas of undesirable foreign materials.

General

The rotor of the Noble mill is 26 inches diameter, 12 inches wide and run at 1800 r.p.m., giving a surface speed of approximately 12,000 ft. per min. The rotor has small grooves milled into its cylindrical surface, each of which collects a small spinner or "bead" of stock from the feed space and carries it under the shoes. There are 21 shoe units in series and, upon leaving the last shoe, the finished stock escapes trangentially from the rotor grooves into the machine outlet. The passage of the stock through the machine is continuous and under full control both as regards quantity of stock and degree of treatment.

Stock Feed

The "feed space" or "engagement area" of the Noblewood mill functions essentially as a stock meter. The grooves in the rotor are milled into its surface without cutting through to the ends so that each groove is, in effect, a bucket which enters the feed space empty except for air. The stock is supplied under regulated pressure. Each groove as it passes through the feeding space picks up exactly the same amount of stock since the fed space is long enough for the stock to force its way into the groove until the force of the air thus compressed, plus the centrifugal force of the stock which has entered the groove, is in equilibrium with the static pressure of the body of stock in the feed space. The amount of stock fed is accurately controlled by the feed pressure, there being a definite relationship between the feed pressure and the volumetric throughput which holds good over a wide range of consistencies.

In this mechanism we have the first essential feature of any continuous treating machine; i. e., controlled capacity. Supplied with each machine is the necessary equipment to control this feed pressure from a constant speed centrifugal pump, able to deliver the required amount of stock at a maximum pressure of 30 lb. per sq. in. at the machine. In case the feed pump is drawing from a chest this consists of automatic regulation of the feed pressure which can be adjusted at will by the person in charge over a range of 5 to 30 lb. per sq. in. This range of feed pressure will give a controllable range of from 25 to 100 per cent of maximum capacity. The maximum capacity is determined by the size and number of the rotor grooves and may be from 100 to 600, or more, U. S. g.p.m.

In other installations the Noblewood mill is required to treat whatever volume of stock comes to it from an earlier stage in the process. In such cases the feed control method consists of automatic regulation of feed pressure reacting from the incoming stock head on the feed pump. This eliminates air binding of the pump and overflowing of the pump box.

Trash Removal

From the foregoing description of the manner in which the stock is picked up by the rotor grooves it can readily be seen that any foreign material of appreciable size is unable to enter the groove with the stock. Any material which enters the grooves must be accelerated to the rotor speed of 12,000 ft. per min. At that speed the centrifugal force amounts to approximately 1200 times gravity. Any foreign particle having a greater specific gravity than the stock must enter the groove against this tremendous centrifuging effect.

In addition to this, consider the fact that the cross section area of the stock in the groove is exceedingly small, too small to accept most foreign objects. A 144 groove rotor operating at a capacity of 60 tons per day on 4 per cent paper stock picks up in each groove a "spinner" or "bead" of stock 11¼ inches long with a cross section area of only 0.0178 sq. in. This is equivalent to an area 0.134 inch square. This small volume of stock is snatched out of the feed box in a time space of only one six hundredth of a second. Any foreign article such as a pin, paper clip, rubber band, scrap of cellophane, etc., is too much entrained in the stock to enter the groove. Furthermore, the scrubbing action of the rotor lands on the surface of the feeding stock tends to align such articles with the direction of rotation thereby arranging them in the most disadvantageous position for entry into the groove.

The net result of all this is a most efficient cleaning action which eliminates from the stock stream all objectionable foreign materials. This trash accumulates against the nose of the first shoe where it packs in a stationary mass. In the back of the feed box is a large flap valve called the trash valve or "junker." This is operated by a lever on the front of the machine. Removal of the trash is accomplished while the machine is in full operation by removing the trash valve for a period of about a half second. When the valve is opened it converges the incoming stock stream into a jet directed at the accumulated trash, at the same time relieving the balance of the feed space to atmospheric pressure. Thus the full pressure of the stock is available to dislodge the trash and carry it out with five to ten gallons of stock. The trash passage terminates in a sump under the coupling, which is connected to the sewer through a grating. This gives an opportunity for examination as to the amount and character of the trash. Operation of the

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trash valve is always advisable once every eight hours. Some foreign material will invariably be found.

Shoe or Stator Units

Each shoe unit consists of a wedge shaped cylinder block containing three double acting hydraulic cylinders which operate in parallel. The pistons are connected to a "carrier bar" which carries the replaceable "shoe" or "stator." Each shoe unit has a five-way valve built into its head and has two water connections to the frame of the machine and one vent to atmosphere. The shoe unit is held to the machine frame by two large cap screws and the hydraulic connections are made through a gasket between the unit and the supporting shoulder of the frame.

The hydraulic cylinders are for the purpose of forcing each individual shoe radially toward the rotor when the treatment of that shoe is desired, and away from the rotor when it is not desired. One of the hydraulic connections to each shoe is high pressure water at 80 to 100 lb. per sq. in. The other is regulated pressure which may be from 30 to 70 lb.. The five-way valve has a recessed indicating shank which is operated by a key wrench. It has four positions and directs the hydraulic supplies so as to obtain the following effects relative to the shoe:

1—Shoe down on rotor at regulated pressure.
2—Shoe down on rotor at high pressure.
3—Shoe up from rotor at high pressure.
4—Neutral with both sides of pistons vented.

Any number of shoes from 1 to 21 may be used in treatment of the stock. Shoes not in use are raised from contact with the rotor beginning with No. 21 and progressing in order back toward the feed space. The 1st position above, is used on shoes in operation. The 2nd and 3rd positions are used to move the shoes toward and away from the rotor. The 4th position is used on shoes not in operation. There is no stop on the radial motion of the shoe toward the rotor. When a shoe is down (in operation) it rests directly against the rotor with its full force on regulated pressure. As wear takes place between rotor and shoes the shoes follow down and take it up automatically.

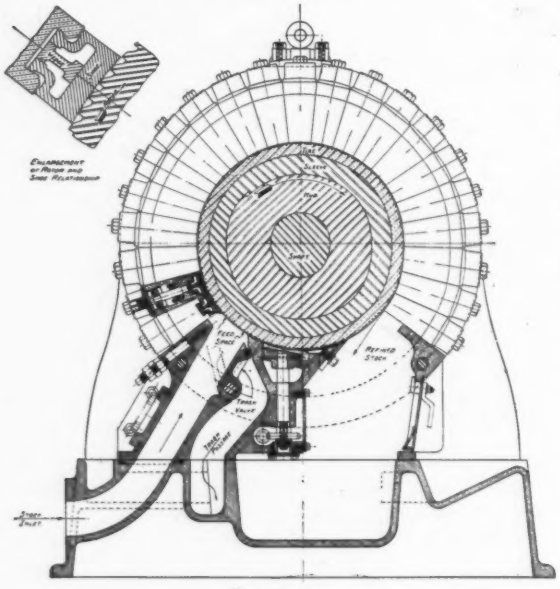

FIG. 1.
Transverse Section

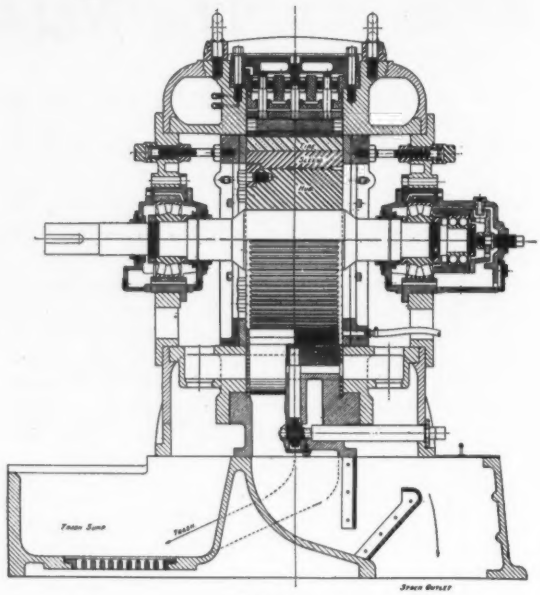

FIG. 2.
Longitudinal Section

Treatment Principle

As mentioned earlier, the principle of "fluid shear" is the basis of treatment in this machine. The foregoing description of the method of feeding and trash removal leaves us with a "bead" of untreated stock in each groove as it enters under the nose of the first shoe.

As the "bead" of stock in each groove is urged forward by the edge of the rotor land, it is forced out against the shoes by centrifugal force amounting to 1200 times gravity. This force combined with the rounded or beveled leading edge of the land squeezes the stock into the nip between the land and the surface of the shoe. This results in a wiping action which draws a thin film of stock out of the stock "bead" and between the land of the rotor and the shoe surface.

This film of stock is the lubricating film between the rotor and shoes and prevents mechanical contact. It ranges between .0007 and .0013 inches in thickness, depending on various operating conditions. It is subjected to a pressure of around 300 lbs. per sq. in. under normal operating conditions with the above mentioned shearing speed of 12,000 ft. per min.

It is probable, and there is much evidence to support the belief, that the majority of the mechanical action which results in increased strength of the sheet takes place in this film. A study of various operating conditions indicates that all of the stock in each rotor groove has an opportunity to pass through the film from 1.5 to 8 times. Necessarily, many fiber bundles, such as occur in groundwood tailings, are unable to get into the film on account of being too large in diameter. These are pinched in the nip between rotor land and shoes and at each pinching are split and subdivided, mostly longitudinally. If the amount of stock in each groove is small, a fiber bundle will get caught in the nip many times and will be completely subdivided. If the amount of stock in each groove is large, due to operating at high capacity, a fiber bundle will have fewer opportunities to get pinched and will

be discharged only partially subdivided. There is ample evidence to show that the "bead" of stock in each groove is rotating at a prodigious speed. This rotation tends to align fiber bundles parallel to the axis of rotation so that they are caught sidewise in the nip rather than endwise. These remarks are based on years of observation of results and only slightly on conjecture.

Shoe Cavities

The working surface of the shoes may be perfectly smooth or may contain cavities such as grooves or holes. Experience has shown that these cavities in the shoe surface have only one effect on the operation of the machine and that is to increase its treating capacity. They have little or no effect on the power per ton to obtain a given degree of treatment and no effect whatever on the quality of treatment as indicated by freeness-mullen or mullen-tear relationships. Shoe cavities are more important in the treatment of coarse materials such as groundwood tailings than they are on fine chemical pulps. Their function seems to be to increase the drag on the stock bead, thereby inducing more rotation and facilitating engagement in the nip.

Control of Treatment

From the foregoing description of the treatment principle, it is obvious that control of the degree of treatment is accomplished by varying the number of shoes in operation and the shoe pressure. Of these two methods, the better is to vary the number of shoes in operation. Less power is required to produce a given strength development with a small number of shoes at high pressure than with a large number of shoes at a lower pressure. For this reason the Noblewood mill is most efficient when operated with the highest possible shoe pressure. The maximum shoe pressure is that at which the shoes will operate without breaking down the film. The pressure at which the film will break is easily established in practice and is practically a constant for a given installation. It may vary from 50 to 100 lb. per sq. in. gauge pressure on different installations. 5 to 10 lb. under the film breaking pressure is safe for operating.

In describing the effect of the throughput on the degree of treatment it becomes necessary to consider chemical pulps separately from such materials as groundwood tailings. The former are treated solely for the purpose of developing formation qualities in the pulp and strength and other physical properties in the sheet. The latter are treated with two purposes: First, subdivision of fiber bundles; second, formation qualities in the pulp and strength and other physical properties in the sheet. Years of experience with commercial installations show that the Noblewood mill actually separates these two functions and applies a different set of rules to each.

In the case of chemical pulps where all the fibers will enter the film without subdivision, a definite set of rules will apply and these may be simply described by a few examples. In the following statements:—

"Throughput" refers to gallons per minute being treated.
"Capacity" refers to A.D. tons per day being treated.
"Quality" refers to type of treatment as indicated chiefly by Freeness-Mullen and Mullen-Tear relationships. A high quality of treatment has a higher Mullen at a given Freeness and a higher Tear at a given Mullen.
"H.p." refers to the power of the driving motor.
"H.p./d.t." refers to the horsepower per daily ton of capacity or horsepower hours per ton, KWH per ton, etc.

When a Noblewood mill is operating at a constant consistency with regulated feed pressure, as when the feed pump is drawing from a chest, the throughput, the h.p., the capacity, the h.p./d.t., the quality and degree of treatment will all remain constant. The degree of treatment may be regulated at will by changing the number of shoes in operation, with corresponding changes in the h.p. and h.p./d.t. but the throughput, capacity and quality will still remain constant. If the consistency is changed, the h.p., throughput, quality and degree of treatment will remain constant. The capacity will change in direct proportion to the consistency and the h.p./d.t. will change in inverse proportion to the consistency. This rule holds reasonably well for consistencies between 2 per cent and 7 per cent although below 3 per cent the quality may drop off slightly.

Now, if the feed pressure is increased the h.p., throughput, and capacity will increase. The quality will remain the same and the degree of treatment and the h.p./d.t. will decrease. If the feed pressure is decreased, the h.p., throughput, and capacity will decrease, quality will remain the same and degree of treatment and h.p./d.t. will increase. For a given consistency, over a wide range of capacity, the h.p./d.t. will correspond to the degree of treatment.

It is apparent that changing consistencies between 3 per cent and 7 per cent have little or no effect on the pulp or sheet qualities but do have a great effect on the capacity of the machine and the h.p./d.t. The highest consistency permitted by other equipment in the system always gives the most economical treatment on chemical or other finely divided pulps.

In most installations consistency is fairly uniform because it is always kept as high as practicable. Therefore, if a machine is running at a given capacity and a greater capacity is required, the feed pressure is raised to increase the capacity and a shoe or two is added to those already in operation to bring the degree of treatment up to the required level. The quality will remain the same as well as the h.p./d.t. but the h.p. will go up.

For control of treatment degree, the temperature difference between inlet and outlet is the best indication. The machine is provided with bulb sockets and a two pen recording thermometer is used. The difference in temperature at constant consistency is directly proportional to the h.p./d.t. spent on the stock, while this in turn is proportional to the degree of treatment. The thermometer serves as a guide to the man in charge as well as a record of treatment. Approximately 87 per cent of the thermal equivalent of the energy supplied to the driving motor shows up as temperature rise in the stock.

When it comes to coarse materials containing large fiber bundles which are very resistant to subdivision, the above rules have to be modified in proportion to the amount of coarse material present. Much experience on groundwood second screen rejects indicates that consistency is not nearly so important a factor. With materials of this nature the h.p./d.t. seems to respond more to the number of fiber bundles that have to be subdivided per minute than to the amount of water in which they are carried. Since subdivision of fiber bundles is always accompanied by film treatment of those fibers which are able to get into the film, no distinct relations have yet been found which apply purely to the action of the machine in subdivision of fiber bundles.

However, taking groundwood second screen rejects

as the toughest material yet encountered, the following remarks may be made: First, between 2 and 6 per cent there is little difference as to the h.p./d.t. required to obtain complete subdivision of the fiber bundles although the higher consistencies seem to give a slightly better quality in the treated stock; second, other factors being constant, an increase in the proportion of large fiber bundles in the furnish will decrease the throughput for a given feed pressure and will increase the h.p. for a given capacity.

In studying the above factors, bear in mind that installations on this kind of stock are made with a screen following the Noblewood mill, the rejects of which are returned directly to the Noblewood mill, along with the initial stock, through a thickener. Results can only be determined from examination of the accepted stock from this screen. The machine, necessarily, has to take whatever stock comes to it from prior units in the system so there is no choice as to capacity, and frequently wide variations. If the consistency is halved, the throughput is doubled and yet, between limits above mentioned, there is little variations in the results or the overall power required. When the incoming capacity is increased, the h.p. will increase but the h.p./d.t. will remain about the same.

Between groundwood second screen tailings and clean chemical pulps there is a large variety of pulps having different requirements as to the proportion of fiber bundle subdivision and film treatment that is required. Sulphite and kraft tailings are easily subdivided and 5 or 10 per cent of such fiber bundles carried by the pulp have little effect on the rules mentioned above for chemical pulps. As the proportion of fiber bundles or their resistance to subdivision increases a deviation from these rules will be noticed tending toward those mentioned for groundwood tailings.

Wearing Parts

The parts of this machine which are subject to wear are the rotor tire, the replaceable shoes and the end seals. Wear is almost entirely of a nature which may best be described as erosion. It is greatly effected by the acidity of the stock and may be four times as rapid on a job where the stock has a *p*H of 5. as on another job where the stock is about neutral.

The machine is so constructed that replacement of all the wearing parts can be accomplished by two men in about four hours. A spare rotor sleeve, spare end seals, and spare shoes are kept on hand. The condition of the rotor sleeve invariably determines the time of replacement since it may wear only about 0.10 inch radially before it should be changed. The shoes wear two or three times as fast as the rotor sleeve but have about 0.50 inch to go before they are worn out. They are always replaced when the rotor sleeve is changed. On jobs where the erosion is great, the end seals are also effected and are replaced with the rotor sleeve. On other jobs they are little effected and may last out three or four rotor lives.

When a worn rotor sleeve is removed it is trued up on a lathe and the grooves are remilled. It is then held for the next replacement job. This reconditioning can be done four or five times or until the rotor sleeve is 1¼ inch smaller in diameter than when new. After this point is reached and the sleeve again needs reconditioning, the tire, which is the wearing portion of the sleeve, is split off and a new one shrunk on. The end seals are trued up in a lathe, whenever necessary, and reused. Worn out shoe blocks are discarded.

Materials

The rotor sleeves and tires in use at present are 0.40 carbon steel annealed forgings. The shoes are common gray cast iron. The end seals are also cast iron. The question will immediately be raised regarding noncorrosive materials. Up to the present time no combination of materials has been found which is more practical than the above. Many materials have been tried and are still being tried. A special alloy, described by metallurgists as about 25 per cent corrosion resistant, is showing promise as a rotor material in combination with cast iron shoes.

In operation, there is occasional "burn" or metallic contact between rotor and shoes. When this takes place the surface of the rotor is heated white hot and quenched thirty times a second. The effect is a surface hardening of the rotor which penetrates a few thousandths of an inch and has a Brinell of up to 600. This apparently considerably offsets the relative softness of the rotor material and enables it to resist erosion. The speed of the rotation of the Noblewood mill rotor tends to limit the choice of materials. A certain degree of ductility is of first importance, otherwise a surface check might develop into a fracture. This eliminates most hard materials, all brittle materials, and most classes of stainless irons and steels.

Rate of Wear

Improvement in the wearing materials will doubtless reduce the rate of wear as experience develops. However, in the meantime, the rate of wear is already exceedingly small and, in fact, the maintenance cost of the Noblewood mill is very low when the large amounts of stock handled and the power consumed are taken into consideration.

Under the most adverse conditions yet encountered, with groundwood tailings and relatively acid water, radial wear of the rotor takes place at the rate of about 0.002 inch per day. On groundwood jobs with neutral water this will be as low as 0.0005 inch per day. Rotor wear in treatment of chemical pulps runs in about the same range, depending upon the *p*H of the stock.

Effect of Wear

After about the first five hours of operation, wear has little, if any, effect on the operation of the machine or the treatment of the stock until the rotor has worn about 0.100 inch radially. It is then ready to be changed. During the first five hours the sharp edges of the rotor lands and shoes are dulled to a radius of about 0.015 inch. As wear progresses this radius increases, but apparently has little effect on the quality or degree of treatment. The leading edges of the rotor lands are milled to an obtuse angle of 135 degrees and the machining leaves this edge sharp. The rotor is able to do some cutting on the stock when this edge is sharp. Formerly it was thought necessary to round this edge to a radius of 0.125 inch but experience has shown that a radius of 0.015 inch eliminates cutting just as effectively as a large radius and has the advantage of leaving greater land area for rubbing.

As wear progresses the rotor grooves become shallower. The shoes follow down automatically. The

depth of cavities in the shoes seems to have no importance as long as they are 0.050 inch deep or more. As the grooves become shallower their cross section area decreases. From the earlier description of the manner in which the stock enters the rotor grooves in the feeding space, it will be seen that more feed pressure will be required to feed the same volume of stock into a small groove than into a large one. Therefore as the rotor wears the feed pressure increases.

When operation is begun with a new or reconditioned rotor the feed pressure for the normal throughput may be, say, 15 lb. per sq. in. As time goes by this will gradually increase. When it reaches around 25 lb. the master mechanic will begin to think about replacing the rotor sleeve and can select a week-end which will be convenient for the job.

Influence of Speed

As mentioned above the standard rotor speed is 1800 of 1760 r.p.m. At this speed the "bead" of stock in each groove is subjected to a centrifugal force of 1200 times gravity. This force might properly be termed the engagement force since it is the force which compels engagement of the stock in the nip between rotor land and shoe surface. At 1500 r.p.m. this engagement force is reduced to 830 gravities and at 1200 r.p.m. to 530 gravities.

Experience has shown that stocks containing large fiber bundles which must be subdivided require an engagement force of 1200 gravities. Eight hundred and thirty gravities at 1500 r.p.m. is not sufficient to insure engagement of the fiber bundles. The refining ability of the machine is so greatly reduced that its capacity must be cut to about one-half of the 1800 r.p.m. capacity. Also, the consumption of power is greater to accomplish the same work on the stock.

With screened chemical pulps 830 or 530 gravities seems to be sufficient for engagement, since the power consumption per ton of pulp for a given degree of treatment is about the same as at the higher speed. However, the machine will not consume as much power efficiently with the result that its capacity is reduced at the lower speeds.

Power and Capacity

The Noblewood mill will economically consume any power from 65 to 800 h.p. and, perhaps, more in some cases. Its throughput may range from 30 to 600 U. S. g.p.m. Over a range of consistencies between 3 and 6 per cent this corresponds to from 5 to 200 a.d. tons per day. These statements simply give an idea of the approximate limitations of the machine without reference to the characteristics of the raw material or the requirement of the sheet. Installations operating at present range between 250 and 800 h.p., most of them being 800 h.p. Their operating capacities range between 10 and 100 tons per day.

The usual method of estimating capacity on a given stock for a given sheet is based on experience with reference to the h.p./d.t. that will be required to accomplish the desired result. Dividing this estimated figure into 800 gives the maximum tons per day capacity for that job. Multiplying this figure by the required tonnage gives the power. Certain other considerations also enter into the picture so that careful study of the peculiarities of each application is necessary before specific power and capacity estimates can be made.

Drying Rate for Book and Other Printing Papers*

By A. E. Montgomery[1]

Abstract

By use of a questionnaire survey drying rates have been established for book and printing papers in a manner similar to that done in the past on other classes of paper. The drying rate for book and printing papers averages lower than for news print, but higher than for other classes studied.

In previous years the Heating, Ventilating and Drying Sub-committee of the Heat and Power Committee has collected data by means of questionnaires on the drying rates of paperboard *(1)*, kraft paper *(2)*, news print *(3)*, writing papers *(4)*, glassine and greaseproof papers *(5)*, and tissue and absorbent papers *(6)*. This was followed in 1936 with a summary *(7)*. During the past year data have been collected on paper board the results of which are being reported at this meeting.

The committee believes that knowledge of what constitutes good, fair and poor practice of drying rates for the various classes of paper would be useful to the mill engineers and operating men in checking any particular machine to see whether it is drying as it should.

Form of Questionnaire

The form of drying questionnaire used for securing the data on printing papers follows the same form used previously. The questions asked were as follows:

1. Number of paper driers
2. Diameter of paper driers
3. Number of felt driers
4. Diameter of felt driers
5. Face width of driers
6. Condition of drier surface (clean-fair-coated)
7. Classification of paper
8. Basis weight (give weight and basis)
9. Speed of machine
10. Steam pressure on driers (if divided into more than one section give effective average)
11. Moisture in sheet entering driers, per cent (this figure is important)
12. Moisture in sheet leaving driers, per cent
13. Comments on any special condition not covered by above, which would influence drying rate on this machine

It will be noted that we do not ask the daily production nor the trim, but calculate the drying rate from the machine speed and basis weight.

Definition of Drying Rate

For our purpose drying rate has been defined as the pounds of paper dried (R_p) or pounds of water evaporated (R_w) per hour per square foot of total paper and felt drying surface covered by the width of the sheet.

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* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Roosevelt Hotel, New York, N. Y., Feb. 20-23, 1939.

Contribution of the TAPPI Heat and Power Committee.

Note: This paper is based on a questionnaire survey made by the Subcommittee on Drying, Heating and Ventilating.

[1] Chairman, TAPPI Heat and Power Committee, Western Manager, J. O. Ross Engineering Corporation, Chicago, Ill.

Method of Calculating Drying Rate

The total drying surface per inch of width:

(1) $S/W = 0.0218\ (N_p\ D_p + N_f\ D_f)$

Where N_p and D_p represent the number and diameter of the paper driers, respectively and N_f and D_f represent the number and diameter of the felt driers respectively.

The drying rate expressed in pounds of paper dried per hour per square foot of drying surface:

(2) $$R_p = \frac{\text{Speed} \times \text{Weight}}{S/W \times K}$$

Where: Speed = Speed of machine in feet per minute.
Weight = Standard ream weight of sheet.
K = A constant depending on the ream size, and which for printing papers on a basis of 25 x 38—500 is 660.

For calculating the pounds of water evaporated per pound of paper dried we have found the following formula most convenient and easily remembered:

(3) $M = B.D./B.D. - 1$

where the B.D. above the line represents the per cent dryness of the sheet leaving the driers (the larger number), and the B.D. below the line represents the per cent dryness entering the driers.

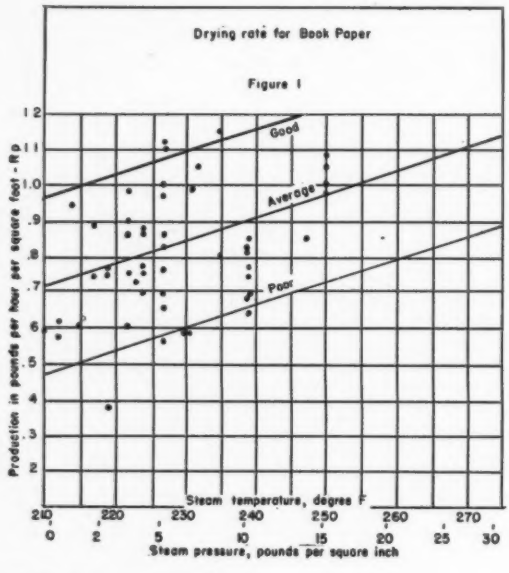
The drying rate expressed in pounds of water evaporated per hour per square foot of drying surface then becomes:

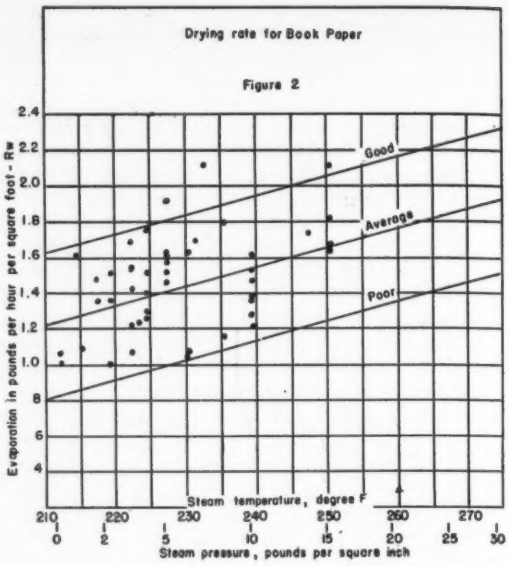
(4) $R_w = R_p \times M$

Fig. 1 shows the production drying rate R_p plotted against steam pressure in the driers. We have assumed here, as in the previous reports on drying rates, that the drying rate varies as a straight line function of the steam temperature corresponding to the saturation temperature at the steam pressure existing in the driers.

Fig. 2 shows the evaporation drying rate R_w expressed in pounds of water evaporated per hour per square foot of drying surface plotted against the steam pressure in the driers.

The lines representing good and poor practice have been drawn arbitrarily with respect to the line representing average drying rate. The available data for book papers are too limited, and the range of steam pressures is not sufficiently wide, to determine accurately the slope of the drying rate lines. In other words, it is not intended that the slope of these lines affords an exact conclusion as to the effect of steam pressure on the drying rates. As drawn, the slope has been determined by averaging groups of drying





rates at different steam pressures and attempting to draw the average line through the average of these groups. The result is that the slope is less than has been indicated on previous reports for other classifications of paper.

The evaporation drying rate R_w shown in Fig. 2 should give a better measure of the functioning of the drier section of a paper machine than the production drying rate R_p because with good water removal on the Fourdrinier end of the paper machine one might obtain a high production drying rate in spite of a poor evaporation drying rate.

The average of the figures obtained may be of interest. Fifty-five sets of data were tabulated representing data on 38 different paper machines. The average of these machines had a paper drying surface equivalent to 28-48 inch diameter driers and a felt drying surface equivalent to 2-48 inch or 3-36 inch diameter felt driers. The average drying surface per inch of width was 32.0 square feet. This average machine was operating on an average basis weight of 54 pounds at a speed of 343 feet per minute with six pounds steam pressure in the driers, the paper going on the driers with an average moisture content of 64.6 per cent and leaving with an average moisture content of 4.46 per cent, giving an average of 1.70 pounds of water evaporated per pound of paper dried.

The average production rate R_p for the 55 sets of data was 0.826 pounds of paper per hour per square foot. The average evaporation drying rate R_w for 51 sets of data was 1.465 pounds of water evaporated per hour per square foot. These average drying rates are lower than for news print, and higher than for kraft paper.

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Anti-Friction Bearings for Paper Machinery*

By R. H. DeMott[1]

Abstract

This paper sets forth some of the more recent improvements made in the application of anti-friction bearings to pulp- and paper-making machinery.

It points out briefly the relative frictional characteristics of the conventional plain bearing and the anti-friction bearing.

It emphasizes the fundamental advantages gained through the use of anti-friction bearings on machinery of the type installed in the numerous new kraft mills built in the south and southwest for the manufacture of kraft paper from slash pine.

It briefly describes applications to pulp grinders, beaters, jordans, presses, driers and calenders.

Twenty-five years ago might be regarded as the approximate time when anti-friction bearings were first applied by the paper machinery manufacturers in this country. During that 25-year period we have seen many changes brought about by engineering studies of the paper industry and machinery entering into it; also by engineering and laboratory research within our own organization to develop types of anti-friction bearings and bearing applications which would prove of advantage to the paper industry.

The machinery manufacturers and the mills are to be complimented on their developments during that same 25-year period and deserve particular praise for the satisfactory handling of what we regard as one of the most important developments—that being the increase in speed of paper machines.

Years ago a kraft machine running at 400 feet per minute was considered to be at top speed, but today machines are designed for speeds up to 1400 feet per minute and operate at 1250 feet per minute. This speed condition in itself has created a greater necessity and demand for better types of bearings, and the anti-friction bearing has played a prominent part in developing machines which would not only run at such speeds, but function over substantial periods of time without operating difficulties.

Some of the reasons anti-friction bearings have been found necessary under the present operating conditions are summarized briefly in the following comparison of the fundamental characteristics of plain bearings versus anti-friction bearings.

The frictional characteristics of the conventional plain bearing are due to sliding within the bearing. If the sliding surfaces are not completely separated, the materials comprising the contact surfaces will have considerable influence. If bearing surfaces are completely separated by a film of lubricant the frictional characteristics are then due to the shearing resistance of the lubricant in the film.

In plain bearings frictional losses will be least when

a. lubricant film thickness is least
b. viscosity is least
c. contact area is least
d. contact surfaces are smoothest
e. form and dimensions of film are just suitable to the particular operating conditions.

Viscosity of the lubricant depends upon temperature and decreases rapidly with the rise in temperature. Therefore, if the lubricating film is thin, viscosity low, contact area small, and temperature high, the film will be in a critical state and in danger of rupture. Safety requires the opposite of each of the above conditions so that these bearings can seldom be designed for minimum friction losses. Lubricant film requires a certain time and speed for its formation, during which wear occurs—thus gradually changing the fit and frictional characteristics.

We may expect more stable efficiency in machines operating for long periods of steady running, such as heavy power plant machinery, than in machines which stop and start frequently. The high starting losses require more power than the running losses, so that they become the criterion for the selection of driving units, which will be, in most cases, larger than for machinery equipped with anti-friction bearings.

By comparison, the frictional characteristics of anti-friction bearings are essentially due to rolling friction, together with some sliding in contact surfaces between races and rolling elements and in the retainer or separator pockets. Friction losses will, therefore, depend upon

a. conformity of the races with the rolling element
b. smoothness of surfaces of the races and retainer pockets
c. internal fit of the bearing
d. alteration of internal fits caused by mounting.

The above features can be controlled closely so that the anti-friction bearing may have inherent frictional stability.

Anti-friction bearings generally exhibit their minimum friction after a few hours' run, and will maintain their efficiency throughout life, provided dirt or corrosive materials have not entered to mar the surfaces. Moreover, they consume only slightly greater power for starting than for running, which feature provides the advantage of smaller driving units.

Until a few years ago the term "anti-friction" was regarded by many as synonymous with "power saving." It is a fact that anti-friction bearings do save power in varying percentages, depending upon the type of equipment in which they are installed, but this question of power saving has been overshadowed by the many other advantages; and, as particularly applied to the paper industry, have played an important part in the following considerations: increased speeds, maximum tonnage, uniformity or improvement of quality of product, low maintenance and lubricating costs, and low cost of manufacture.

Time does not permit of a complete or detailed discussion of the numerous applications of anti-friction bearings to pulp and paper machinery, so we will concentrate the following discussion on what we

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Roosevelt Hotel, New York, N. Y., Feb. 20-23, 1939.

[1] General Sales Manager SKF Industries, Inc., Phila., Pa.

consider to be some of the more outstanding applications of the past several years.

Pulp Grinder

Although the pulp grinder offered what appeared to be a very lucrative field for anti-friction bearings, it was not until a few years ago that we had available a type of bearing which we considered satisfactory from the cost and operating points of view. During the past few years we have made a number of installations to the two-pocket type of grinder and are advised by our connections abroad that our bearings have been applied to approximately 230 pulp grinders of various types operating in European and Canadian mills.

Fig. 1 illustrates the type of application to a two-pocket grinder having a shaft diameter of approximately 13¼ inches. The bearing is a self-aligning roller bearing having a tapered bore mounted on a tapered sleeve. This mounting eliminates expensive shaft shoulders, is simple to install, also easy to remove, thereby minimizing the time the grinder is out of commission.

The housing is of the conventional split type pillow block construction and we call particular attention to the labyrinth type of seals and the shroud for providing maximum protection against the intrusion of water.

Oil is used as a lubricant and its leakage is prevented by the lip on the inside of the housing end covers as well as by the passages in the labyrinth seal, which are filled with a hard fibrous grease.

Anti-friction bearings of this type on pulp grinders allow a material reduction in the width of bearing application for the loads involved, thereby reducing the amount of space required for the complete installation. They further keep the stone centrally located with reference to the grinder pockets and allow for a closer setting of the pockets to the stone, thereby reducing the amount of shims or slivers produced.

Tub Beaters

Before the introduction of the breaker beater, many manufacturers and mill operators considered it inadvisable to apply anti-friction bearings because of the extreme pounding effect on the bearings when stock was furnished to the beater in laps or broke.

However, by the proper selection of type and size of anti-friction bearings (Fig. 2) this hammering effect of the breaker beaters can be satisfactorily overcome and may be regarded as simply another factor entering into the selection of the proper bearings.

We have made a number of satisfactory installations on breaker beaters, but our greatest activity

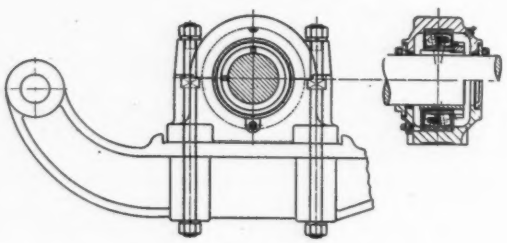


FIG. 2.
General assembly and bearing mounting used on tub beaters.

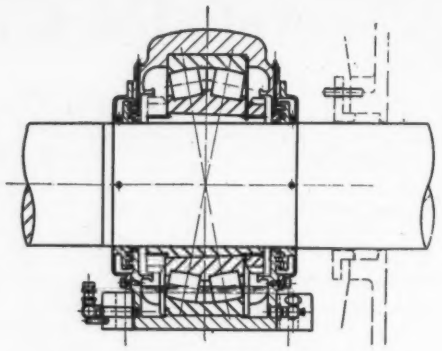


FIG. 1.
Section showing mounting of bearing employed in a two pocket grinder equipped with spherical roller bearings.

has been with the "supplementary beater." We have approximately 75 supplementary beaters equipped, or in the course of construction, in the United States today.

The greatest advantages obtained from the self-aligning roller bearing are, first, in relieving the bearings themselves from internal binding strains due to misalignment from any cause; second, in keeping the roll lined up so that when once adjusted to the plate it is possible to delicately lighen the roll with reasonable assurance of obtaining uniform bar contact with the plate, which results in a better stock in the shortest period of time.

Jordans

Wear in the conventional plain bearing permits the plug to move from its center line position, causing the plug bars to contact the shell bars on one side only, thus producing unequal wear on the shell bars. With this condition full refining action of the jordan cannot be obtained; therefore, the bearings must be frequently rebabbitted, at which time it also becomes necessary to regrind the bars.

It has also been found that when plug and shell are refilled the bearings must be rebabbitted in order to secure proper center line position of the plug with the shell.

With anti-friction bearings the plug is maintained in a definite center line position with respect to the shell; consequently, uniform wear takes place between plug bars and shell bars, resulting in more uniform stock and longer life of filling.

Maintenance expenses are definitely reduced to a minimum through the use of anti-friction bearings because of the elimination of the rebabbitting program and the reduction in regrinding and refilling costs of plugs and shells.

One mill wrote us recently pertaining to a change-

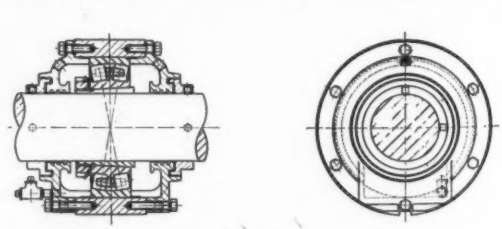


FIG. 3.
Sectional view showing spherical roller bearing mounting for coupling end of jordan engine.

over from plain bearings to our spherical roller bearings made a little over two years ago. We quote the following from this letter:

"This installation has shown marvelous results. With our old type of steel filling we obtained an increased life of 40 per cent, but best of all it made possible the proper use of stainless steel fillings, which in two more weeks will have been in operation two years.

"After a recent inspection it was found that the plug and shell were worn an even amount over the entire surface and that we can expect at least one more year's service.

"Compare this with an average of seven months and two chippings before installation of your bearings. The saving in labor of chipping and bearing repair has been considerable.

"Power consumption reduced 4 per cent. Hard to express in dollars and cents has been the value of the straight line performance or uniform work done on the stock during this period."

Although the above quotation indicates power saving of 4 per cent, it is difficult in many cases to determine the extent of power saving because with the anti-friction equipped jordan the mill usually continues to use just as much power as it did with the conventional bearing. However, the anti-friction bearing equipped jordans will do more and better work on the stock. One mill reports they are doing three times the amount of work with a jordan equipped with spherical roller bearings as against a similar one equipped with the conventional plain bearing.

Figs. 3 and 4 show the application of a single self-aligning roller bearing on both ends of the jordan. The coupling end bearing has a tapered bore mounted on a tapered adapter sleeve, which eliminates the necessity of shouldering the shaft. The thrust end bearing has a tapered bore mounted on the push-in type adapter sleeve, which permits of easy application and removal of the bearing in cases of necessity.

Both bearings are mounted in piston-type housings which are supported in cylindrical guides. Rotation of the housing is prevented by keyway shown at the bottom.

The same types of bearings have also been mounted in the conventional guide or trough construction, the bearing housing characteristics being changed in order to provide a square or rectangular section on the lower half, with lips at the center line in order that the plates bolted to the sides of the channel will prevent the housing from lifting out of position.

Fourdrinier Section

It hardly seems necessary to discuss the application of anti-friction bearings to rolls in the fourdrinier sections such as breast, table, stretch, guide, and carrying rolls, because this constitutes the small roll section of the machine and also the rolls on which some of the earliest anti-friction bearing installations were made. These applications have proven to be extremely satisfactory, and a brief word as to their general advantages will, unquestionably, be interesting. There is hardly a machine today without this section completely equipped with anti-friction bearings.

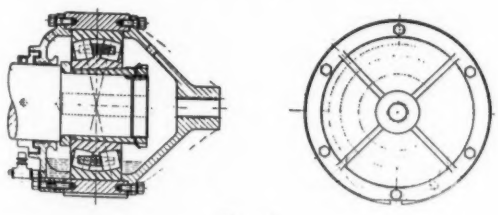


FIG. 4.
Showing the spherical roller bearing mounting for the thrust end of a jordan engine.

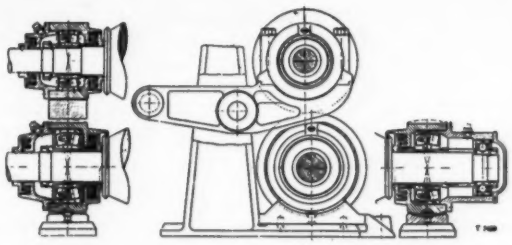


FIG. 5.
Showing types of mountings for upper and lower press rolls. Alternate methods are shown for lower presses.

As we all know, there are tons of water handled by the fourdrinier section every day. Engineers have in past years spent a great deal of time and thought in an endeavor to perfect a conventional plain bearing which would retain oil and keep out water. Water persisted in entering the bearings, washing out the oil, with consequent wearing of the pournals and cutting out of the bearings. It was, therefore, difficult to keep the rolls in proper alignment and just as hard to keep them turning. When a table roll drops because of bearing and journal wear, the drainage at this particular point ceases, and, consequently, the roll must be adjusted to again contact the wire. If the roll contacts the wire and because of excessive friction in the bearing, fails to turn, it causes wear on the wire, also wear on the table roll face, causing flat spots, and when the roll start turning again, these flat spots bump the wire and disturb the stock, causing an improper formation of the sheet.

The wire must drive the table rolls, and the easier they turn and maintain their proper position, the longer will be the wire life, the better the stock and the lower the cost per ton. These advantages can and have been obtained through the use of anti-friction bearings, and practically every fourdrinier section built today is so equipped.

Press Rolls

Observation of numerous plain bearing bottom press rolls definitely shows that there is more wear

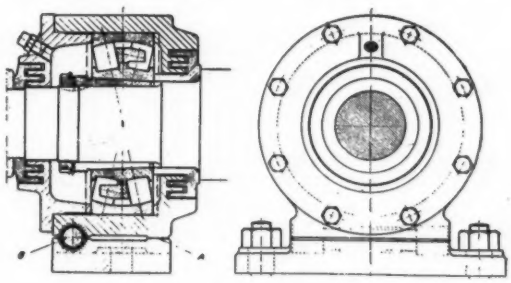


FIG. 6.
Bottom press roll housing of the hinge joint type.

on the driving side than on the front side, thereby causing troublesome misalignment of the bottom roll. If the top roll remains in proper position the rolls are then actually crossed, resulting in heavier pressure on the center of the rolls than toward either end. This produces an uneven caliper of sheet, uneven drying due to this condition, and, when running light-weight papers, will cause cockles and wrinkles.

In discussing the top press roll it must be realized that the felt and paper between the bottom and top rolls are the actual driving media for the top roll. In other words, the soft, mushy sheet of paper must help in keeping the top roll in motion, and if the top roll bearings seize or bind, crushes or shoves will occur.

With anti-friction bearings on both bottom and top rolls these rolls are maintained in a definite position and, because of the ease of driving the top roll, damage to paper stock is eliminated. Figures 5, 6 and 7 show types of application for top and bottom press rolls.

Anti-friction bearings for press felt rolls and also for the greater number of drier felt rolls offer definite advantages through reduction of the drag on the felt in driving them; also by the reduction of bearing wear and the maintenance of roll position, the guiding action of the guide rolls is reduced to a minimum, with consequent reduction of strain and wear on the felt.

For inside rolls as well as for stretch and automatic guide rolls it is desirable to provide the self-aligning type of housing in order to permit the raising of the front side of the roll far enough to insert the felt. These applications are illustrated in Fig. 8.

Drier Cylinders

Due to the trend in recent years toward wider machines, higher speeds and higher drying temperatures, the demand for a satisfactory anti-friction bearing application has become more apparent, in order to keep the drier cylinders in proper alignment, reduce the power required at starting and reduce the maintenance and lubricating costs.

In the conventional plain bearing with the driers stopped, the weight of the roll will cause most of the oil to be squeezed out from under the journal and the remaining oil will be dried up by the hot journal. This causes a bond between the bearing and the journal surface, and when the driers are started this bond must first be broken and the cylinder brought up to a certain speed before the lubricant film is created.

Starting under such conditions requires considerable power; wear in the bearings develops, thus throwing gearing out of proper mesh, with consequent loss in efficiency, and the cylinders drop out of line sufficiently to stretch one edge of the sheet to such an extent that it may run into a wrinkle at the calenders or produce a finished sheet which may not lay flat.

FIG. 7.
Guide and stretcher roll mountings

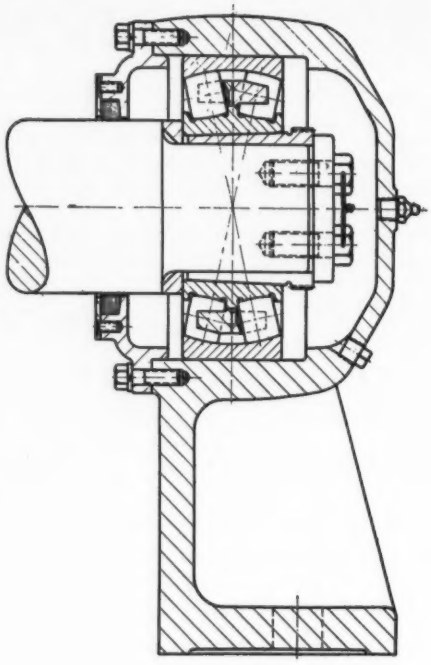


FIG. 8.
Felt-carrying roll mounting using the removable sleeve method of mounting.

Anti-friction bearings can and have eliminated these difficulties, but the application has not been a simple one. On the wider machines it has been found necessary to have a self-aligning feature within the bearing element, and of equal or greater importance a mounting which will freely handle the expansion and contraction of cylinders without binding strains in the bearings, or subjecting the main frame to heavy thrust loading.

On a 240 inch cylinder it was found by actual measurement that the center line distances between back side and front side bearings will expand ¼ to 5/16 inch from a cold-to-hot condition.

We believe one of the most outstanding contributions to the paper industry has been the design and application for drier cylinders as described briefly as follows: The bearing mounting for the driving side, Figure 14, is of the split pillow block construction, machined to stabilize the self-aligning roller bearing axially so as to hold the cylinder against endwise movement. This housing has also been made of the solid cartridge type for bolting to the side of the machine frame or casing.

Figs. 9 and 10 show two methods of applying the self-aligning roller bearing to the shaft, in both cases

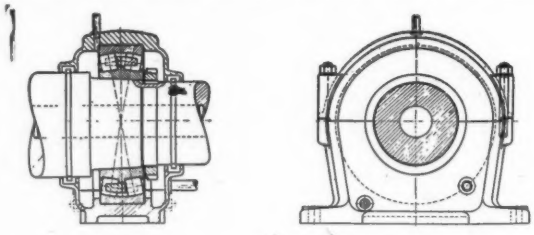


FIG. 9.
Sectional view of drive side housing showing method of stabilizing bearing mounted on taper journal.

the bearing having a tapered bore. Fig. 9 employs the tapered journal, whereas Fig. 10 shows the bearing mounted on a removable tapered sleeve.

The bearing mounting for the tending side, as shown in Figs. 11 and 12 has proven itself over a long period of time to be most effective in compensating for cylinder expansion and relieving the bearings and side frames of thrust loads. The theory of the mounting is simple and effective. It consists essentially of three movable supports on which the bearing housing rests. This construction permits the housing to move axially within the necessary limits with extremely little friction, and yet maintains the shaft at a constant center height. It may not at first be apparent that the constant center height is maintained, but if one considers the very simple example of a wheel, it becomes obvious that the hub of the wheel describes a horizontal line as the wheel rotates on its path of travel.

With these three pieces (Fig. 11) giving three-point support, there is the definite assurance of absolute stability to the bearing housing. The supports themselves are capable of carrying enormous loads, many times the working loads of the drier cylinders.

The bearing housing is guided in the horizontal direction between guide plates bolted to the machine frame (Fig. 11) and axially by locating the bearing in the housing (Fig. 12).

All the kraft machines built for the southern mills during the past three or four years have been equipped by the manufacturers with the above type of application.

The general advantages of anti-friction bearings as applied to drier cylinders may be summarized as follows:

1. Definite reduction in power at starting. We know of cases where recommendations for starting generators are based on the consideration of anti-friction bearing equipped machines, vs. conventional plain bearing equipped machines, and, by comparison, the generator capacity, when the anti-friction bearing machines is considered, may be 20 per cent less than for the corresponding plain bearing equipped machine.
2. The self-aligning feature within the bearing compensates automatically for any misalignment caused by warpage of the side frames and initial inaccuracies of lining up the machine frame or cylinders.
3. The elimination of wear in the bearing will assure the permanent position of the cylinders providing for less wear in driving gears, with consequent maintenance of gear efficiency.
4. By maintaining the cylinders in proper position there will be less strain on the felt and better assurance of satisfactory finished paper stock.

Calenders

Anti-friction bearings applied to the rolls of calender stacks offer three fundamental advantages, namely, reduction in starting torque, maintenance of roll alignment (thereby keeping thrust at a minimum) and reduction in operating power consumption.

In any calender stack equipped with conventional plain bearings, whether it be a machine or supercalender, the majority of power consumed is due to end thrust of the rolls. This end thrust is due to misalignment and only a slight amount will cause the rolls to act like a powerful screw. This condition is most noticeable on supercalenders having hard and soft rolls wherein it is difficult to keep exact roundness of the soft rolls. While conventional plain bearings may be satisfactorily adapted to provide initial alignment, any subsequent wear taking place will bring about severe thrust loads. It is difficult to design a plain thrust bearing in the space available in the calender stack, as the thrust on an ordinary size machine may run as high as three to four tons per roll with a maximum misalignment of 0.01 inch.

The anti-friction bearing assures of much better roll alignment and, in addition, is well suited to absorb the thrust loads.

In one of the eastern mills we had an interesting comparative experience with a supercalender. This calender had the top and bottom rolls equipped with anti-friction bearings to carry radial loads and bronze thrust collars. All intermediate rolls were on plain, radial and thrust bearings. This calender was then changed by removing the bronze thrust collars from all rolls and in their place installing one single row deep groove ball bearing on the tending side of each roll for the purpose of taking double-direction thrust

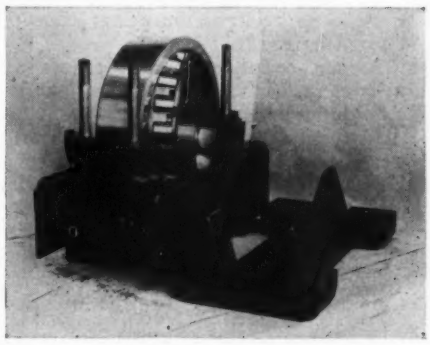


FIG. 11.
Showing the parts of the tending side housing used on drier cylinder applications. Notice the three rocker wedges on the base plate that permit the housing to move axially providing for free expansion and contraction in the drier cylinder.

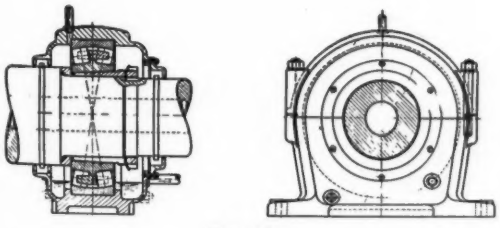


FIG. 10.
Another section view showing taper bore bearing mounted on straight journal by using the removal sleeve method of mounting.

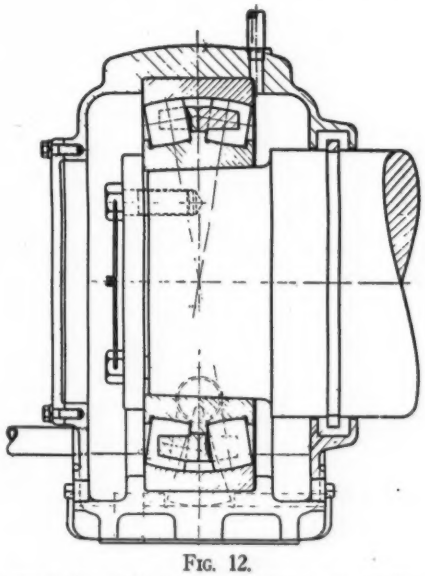


FIG. 12.
A sectional view of the bearing mounting on the tending side.

only. This change reduced the power consumption from 134 to 87 h.p.

Subsequently, a second super-calender was installed using anti-friction bearings throughout, and while there was no noticeable additional power saving over the minimum required by the first machine after the changeover, it was possible to maintain the power consumed on the second calender at approximately the same point continuously.

On machine calenders equipped with anti-friction bearings the saving in power is not as great as on the supercalender, but as near as can be discovered, the saving is about 25 per cent over the well-designed plain bearing and will run as high as 50 per cent when the design of the plain bearing is such that water-cooling is required, or wear has taken place.

On machines operating at variable speeds, such as supercalenders, it is customary to use the variable direct current drive. These machines thread through at a speed of 50 feet per minute, and if the rolls are on plain bearings then it is difficult to overcome the torque and keep the calender rolling at thread-in speed without some auxiliary control device to produce voltage variation so that the motor will not stall or run too fast after the machine is started. With anti-friction bearings such auxiliary equipment is not necessary and no difficulties are experienced in operating the machines at a uniform thread-in speed, and also the motors do not have to produce high starting torques at low voltages.

Another point in reference to supercalenders which is very important is the elimination of roll heating in modern high-speed equipment brought about by the conventional plain bearings. This applies very particularly to rolls built of compressed paper and which must operate at temperatures of 150 to 175 deg. F. in order to produce proper calendering. These rolls have been known to burst from expansion at about 250 deg. F., and there has been considerable trouble with rolls wherein excessive journal heating causes unequal expansion along the length of the roll. It is universal practice to use water cooling and circulating oil systems.

The above difficulties have been eliminated through the use of anti-friction bearings, and a leading engineering executive of one of the large eastern mills contends that stacks with anti-friction bearings have much better roll life than those without; in fact, he believes it is practically impossible to operate at high speeds and high finishes without the use of antifriction bearings. Figs. 13, 14 and 15 show mountings for top, intermediate and bottom rolls for supercalenders, respectively.

The top and bottom rolls show the use of two tapered bore spherical roller bearings per neck, the inner bearing mounted on a tapered journal, the outer bearing mounted on a push-in type adapter sleeve.

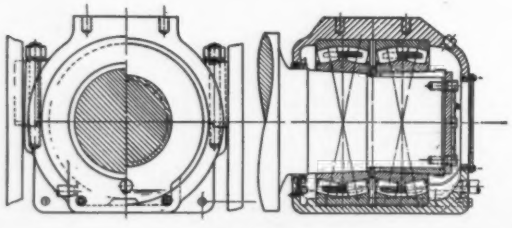


FIG. 13.
Bearing mounting for top roll of a large super-calender.

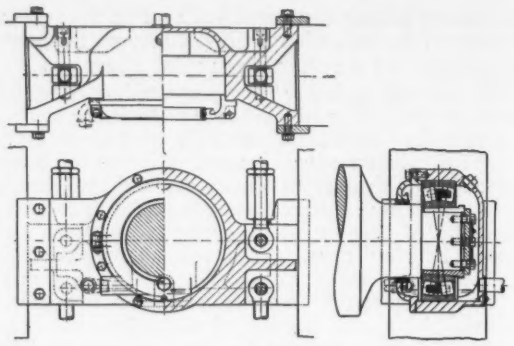


FIG. 14.
Intermediate roll mounting for super-calender.

This type of application provides for the maximum bearing capacity within the space available between the neck diameter and frame opening.

We call particular attention to the design and construction of the bottom roll housing which provides for lateral expansion and contraction of this roll. The principle employed is similar to that used on drier cylinders described previously, but instead of using three wedge-shaped rockers, only two are required.

The intermediate roll design shows the use of a single spherical roller bearing per neck, which can be done on a supercalender where the lifting screws are on the center line of the bearing. If the lifting screws are on the outside of the frame then it is necessary to provide a simple two-bearing application.

In a recent discussion with an executive of a prominent paper machinery manufacturer he expressed himself as follows, pertaining to the general advantages of anti-friction bearings as applied to pulp and paper machinery:

"1. Positive maintenance of alignment between the various rolls.
2. Greatly reduced starting torque for all heavy sections but most pronounced for dryer section and calender stacks.
3. An approximate 15% power saving in comparison to a high-grade plain type bearing.
4. Ability of anti-friction bearings of proper type to take the end thrust of the various rolls without appreciable wear. This applies to table rolls and breast rolls of the Fourdrinier part, both of which shake. This same characteristic might be mentioned for calender rolls that are subject to considerable end thrust and where difficulty has been encountered in properly lubricating the thrust collars of plain type bearings.
5. Ordinarily the anti-friction bearing makes it much easier to obtain complete retention of lubricant within the housing as compared to a plain bearing, thereby reducing lubricating costs and preventing lubricants from contaminating the paper.
6. Slight reduction in wire, press felt and dryer felt costs due to reduced running torque."

Acknowledgment

In conclusion may we thank the manufacturers of pulp and paper machinery and the pulp and paper mills for their interest in this question of anti-friction bearings and for their cooperation in making the numerous applications possible and successful.

May we also thank the Technical Association of Pulp and Paper Industry for their interest in this subject and for the opportunity given us to present this discussion.

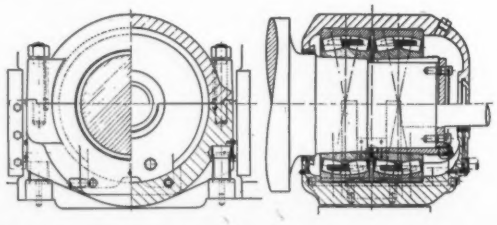
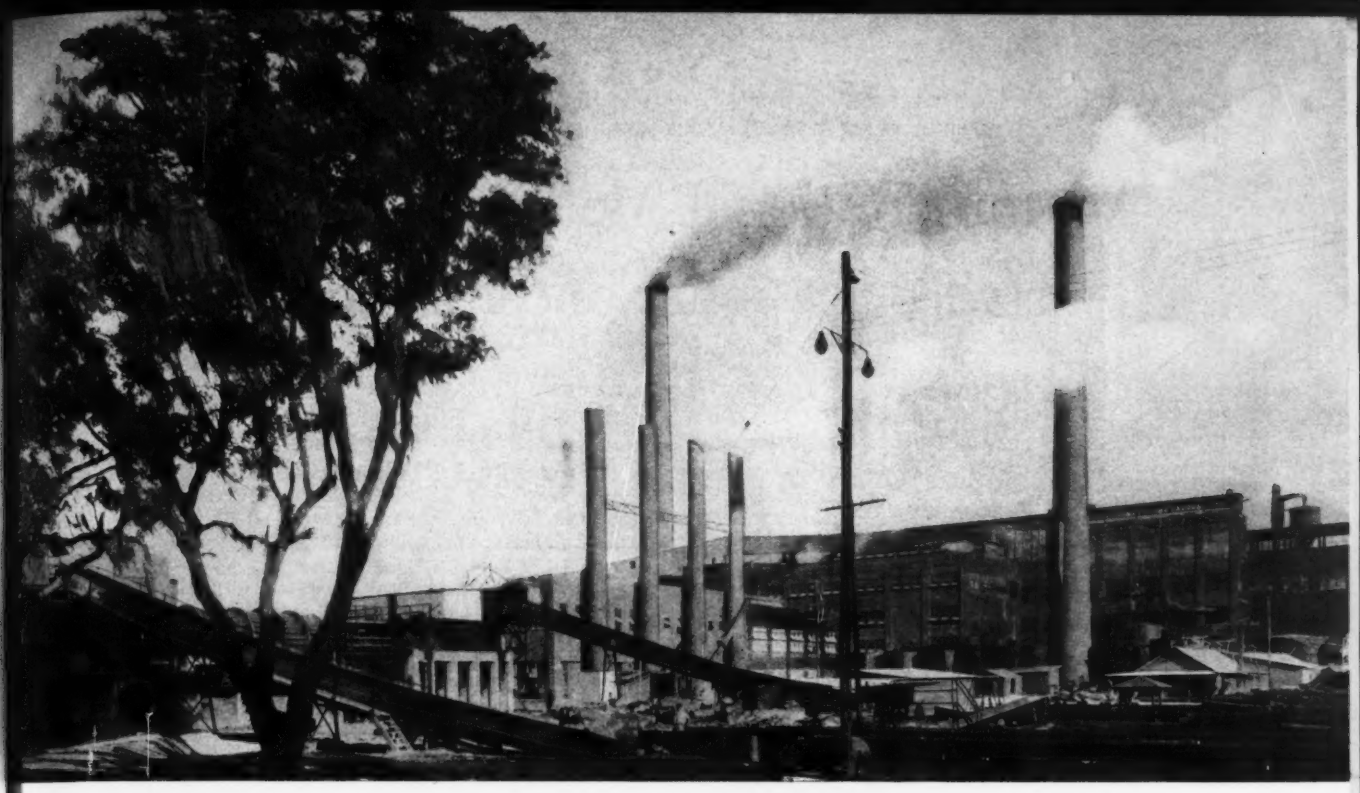


FIG. 15.
Shows the bottom roll mounting for super-calenders. In this mounting roll expansion is taken care of by the same method as for drier cylinders.



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A More Rational Method of Stating Hydrogen-ion Concentration*

By L. M. Booth [1]

Abstract

The prevailing method of expressing hydrogen-ion test data is complicated. Too much explanation is needed. Confusion arises from the lack of familiarity with logarithms by the majority of those who are concerned with pH readings.

In that portion of the pH scale near the neutral point minor differences of hydrogen-ion concentration are too strongly stressed. In the ranges remote from the neutral point, major differences are minimized.

Wherry has proposed an arithmetical system of statement of hydrogen-ion test data which may be easily comprehended. His plan and the reasons for its adoption to supplant the commonly used reciprocal logarithmic method of statement of results, form the basis of this presentation.

The adoption of the symbol AA, representing arithmetical values of Active Acidity and Active Alkalinity, to supplant pH reciprocal logarithmic numbers is recommended.

The perplexities of the pH system of statement are cited and examples of why the AA plan of presenting hydrogen-ion test data will insure greater accuracy of control of chemical processes, are set forth.

Introduction

The adoption of numerical reference standards, supplanting estimates and guesses, constitutes one of the outstanding achievements of modern industrial progress. The value of these measurements is largely dependent upon the ease and convenience with which the data may be assimilated by those who are called upon to interpret the figures.

Some years ago, with a view to increasing knowledge of conditions prevailing in his work, the paper technician seized upon hydrogen-ion determinations, and following the widespread usage, expressed the hydrogen-ion values in terms of *p*H numbers.

However, paper makers, like most practical folks, think in terms of acidity and alkalinity, and habitually prefer to start from the neutral point and to progress from it arithmetically in the direction of increase in one or other of these factors. This situation prevails when normal solutions, made up in grams per liter, are employed in the laboratory as well as when using tons of commercial chemicals. If the quantities of substances concerned in the production of alkalinity or acidity are expressed arithmetically, why should not the intensity of alkalinity and acidity be similarly expressed?

Dr. Wherry Discusses Method

This question has been discussed at length in an article by Edgar T. Wherry[2] "A New Method of Stating Hydrogen-ion (Hydrion) Concentration" *(1)* from which quotations follow:

"In 1909 Sorenson pointed out that the logarithm of the reciprocal of the hydrion normality is directly related to the electrical potential due to the hydrion, and suggested a symbol somewhat inconvenient to set in type, and the American biochemists have adopted *p*H. Because of its theoretical significance this method of stating hydrion concentration has come into general use by scientists. *(2)*

"There are several objections to this system. The fact that the order of numbers is the reverse of that used in all ordinary methods of measurements is most serious. To have the greater acidity represented by the smaller number is enough to preclude its ever coming into general use by laymen, who numerically vastly preponderate over scientists. Scarcely less objectionable is the fact that the numbers are related logarithmically instead of arithmetically. Few persons indeed, whatever their training, can recognize off-hand that orange juice, with an average *p*H value of 3.6, is 8 times as sour as grape juice, with *p*H 4.5, yet the fact that these numbers are negative logarithms makes that the relation between them.

"A further objection to the *p*H system of statement is that scientists not infrequently overlook the logarithmic character of the numbers, and perform operations with them, such as arithmetic averaging, plotting against arithmetic quantities, etc., which may lead to erroneous results or conclusions. Two instances may be cited. In a recent study *(3)* of the reaction preference of spinach, this plant was grown in solutions with the *p*H values 4, 5, 7, 8 and 9, and the maximum yield was obtained at *p*H 5, which was assumed to be its optimum soil reaction. However, the curve obtained by plotting the data, using arithmetical quantities on both axes, has a maximum at about *p*H 6.7, which is close to the neutral point, and therefore accords with the practical experience that this crop is markedly responsive to neutralization of the soil by lime. The experimental data were correct, but as a result of overlooking the significance of *p*H values, an unwarranted inference was drawn. Again, as pointed out by Alexander, *(4)* in a recent elaborate work on the proteins, arithmetical data on swelling and other behaviors of gelatin were plotted against the logarithmic *p*H values, and the conclusion was drawn that this substance is a definite chemical compound which unites stoichiometrically with acids. A more judicious method of plotting would have shown this conclusion to be untenable. Moreover, it has become unsafe to judge the direction of changes in reaction from summaries or abstracts of papers, for some authors and abstractors say the hydrion

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* To be presented at the Annual Meeting of the Technical Association of Pulp and Paper Industry, Roosevelt Hotel, New York, N. Y., Feb. 20-23, 1939.

[1] (Deceased). Formerly Member TAPPI, President, Booth Chemical Company, Elizabeth, N. J.

[2] Botany Department, University of Pennsylvania, formerly with U. S. Department of Agriculture. Dr. Wherry has carried on scientific work in many fields, pioneering in the application of pH measurement to the study of soils in relation to plant growth. (1916-1920).

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concentration decreases when a solution becomes more acid, and others say that it increases.

"My attention was directed in 1916 to the desirability of having a more readily understandable method of stating acidity and alkalinity when I undertook a study of the soil-reaction of a native plant, the Walking Fern *(camptosorus rhizophyllus). (5)* Because of the considerations opposing the use of logarithms just discussed, I decided to adopt an arithmetical mode of statement. The anti-logarithms of the *p*H values were, however, obviously too unwieldly. I therefore took the additional step of making the *p*H value at neutrality a starting point, which gave relatively simple numbers for the liquids (soil extracts) under investigation. Moreover, when a soil was acid it was so described, and when alkaline this was so stated, whereas in the *p*H system only acidity is considered, even in the most alkaline of solutions. I later discovered that a similar plan had been proposed four years earlier, *(6)* but had never come into sufficiently general use to have been mentioned in the reference works I had consulted. Analogous procedures were also worked out independently by Henderson *(7)* and by Tillmans. *(8)*

"During the succeeding ten years I have endeavored to improve upon the original plan, partly in response to various published criticisms and partly as a result of constructive suggestions by colleagues. The form which the method has now taken is as shown in the annexed table. *(9)*

COMPARISON OF METHODS OF STATING REACTIONS

pH	Active Acidity	pH	Active Alkalinity
3.0	10,000	7.0	0.0 Neutral
3.1	8,000	7.1	0.5
3.2	6,300	7.2	1.0
3.3	5,000	7.3	1.5
3.4	4,000	7.4	2
3.5	3,150	7.5	3
3.6	2,500	7.6	4
3.7	2,000	7.7	5
3.8	1,600	7.8	6
3.9	1,250	7.9	8
4.0	1,000	8.0	10
4.1	800	8.1	12.5
4.2	630	8.2	16
4.3	500	8.3	20
4.4	400	8.4	25
4.5	315	8.5	31.5
4.6	250	8.6	40
4.7	200	8.7	50
4.8	160	8.8	63
4.9	125	8.9	80
5.0	100	9.0	100
5.1	80	9.1	125
5.2	63	9.2	160
5.3	50	9.3	200
5.4	40	9.4	250
5.5	31.5	9.5	315
5.6	25	9.6	400
5.7	20	9.7	500
5.8	16	9.8	630
5.9	12.5	9.9	800
6.0	10	10.0	1,000
6.1	8	10.1	1,250
6.2	6	10.2	1,600
6.3	5	10.3	2,000
6.4	4	10.4	2,500
6.5	3	10.5	3,150
6.6	2*	10.6	4,000
6.7	1.5	10.7	5,000
6.8	1.0	10.8	6,300
6.9	0.5	10.9	8,000
7.0	0.0 Neutral	11.0	10,000

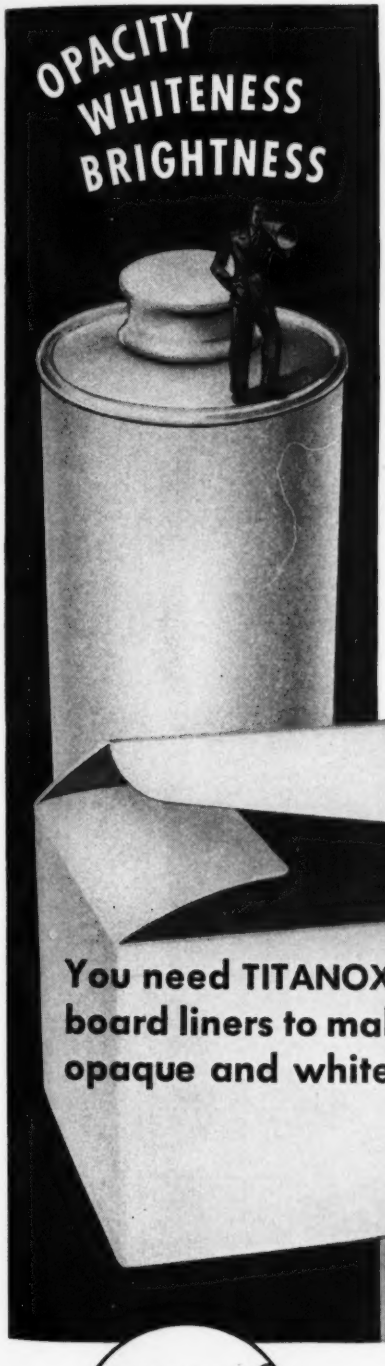
* In the upper part of this column the active acidity values are hydrion concentrations, referred to 10^{-7} as a unit. From *p*H 6.6 to 7.0, however, the active acidities are less than the hydrion concentrations. This is due to recognition of the fact that in this range (in accordance with the relation cH = 1/cOH) the hydroxylion concentration becomes high enough to exhibit a significant neutralizing effect. At *p*H 7.0 the hydrion concentration is unity, but as the hydroxylion concentration is likewise unity, the effect of the latter balances that of the former ion, and the active acidity becomes zero.—E. T. W.

"In the first column of the table are placed the *p*H values, which represent electrical potential due to hydrion. They are negative exponential numbers. Accordingly, the greater the acidity, the smaller the number, which each unit is ten times as large as the next below. In order to have some means for grasping the relative degrees of acidity actually indicated by these numbers, those given in the second column have been calculated. The method by which they have been obtained is as follows: The amount of hydrion present in a liter of pure water—which can be determined by physico-chemical measurements even though its tendency to produce acidity is neutralized by the presence of an equivalent amount of hydroxylion—is taken as a unit of acidity; it amounts to 0.000,000,1 gram. By the use of a table of logarithms, the quantity of these units represented by each successive *p*H number is calculated. From the total amount of hydrion thus calculated is subtracted the amount of hydroxylion which is also present, the one being the reciprocal of the other, and the result is rounded off to the nearest 0.5. This yields the amount of hydrion present in the solution, free to exert the effects commonly classed as acidity; and it is accordingly termed *active acidity.* (Not to be confused with the physical chemical term "hydrogen ion activity" (a_{H+})). These active acidity numbers are then not "percentages" or "degrees" but rather "acidity units per liter." They are directly related numbers, if one solution is found to possess an active acidity of 500 and another an active acidity of 20, the first can be readily seen to contain twenty-five times as much active acid as the second.

"On the alkaline side of the neutral point, represented by the right-hand half of the table, the procedure is similar, but there are certain modifications. On theoretical grounds, the *p*H numbers are customarily given, even on the alkaline side although here the effect of hydroxylion overbalances that of hydrion. As the amount of one ion present is always the reciprocal of the other, however, no difficulty is introduced into the calculations. Admitting the theoretical desirability of having a continuous series, I nevertheless feel that as soon as the reaction of a solution has been shifted any distance to the alkaline side of the neutral point, it is the large excess of active alkali rather than the minor amount of acid still present which is biologically effective. Hence I prefer to use values for the *active alkalinity* on this side. The unit here is 0.000,000,1 gram-equivalent of hydroxylion per liter; as before, the amount of the other ion present in each case is subtracted and the results rounded off.

"Two sets of numbers are thus made available—*p*H for those who can use logarithms in mental calculations, active acidity and alkalinity values for those who prefer arithmetic.

"Some critics point out that the *p*H system is almost universally used among scientists, and that there is accordingly, no need for another. To this I would reply that as scientists come to realize the need for making technical information more intelligible to the laymen, new and improved methods of statement of data are sure to be developed. Others object to the division of the reaction-series into two parts at the neutral point. To this I have already replied, *(10)* pointing out that my plan is just as capable of being continued through the neutral point as is the *p*H system. There are, however, undoubtedly some cases where it is desirable to consider alkaline solutions to be alkaline, and then the neutral point forms the



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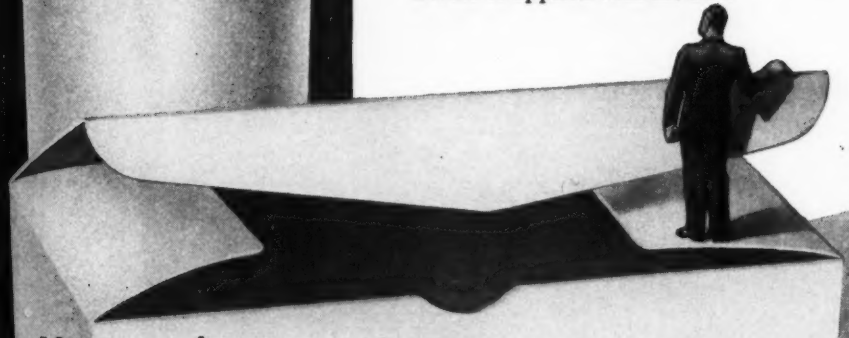

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logical basis for the separation of these from acid solutions. As far as plant growth is concerned, it has recently been suggested by Olof Arrhenius *(11)* that hydroxylion may be as important as the hydrion, which has been almost exclusively considered heretofore. He, however, is not prepared to deviate from the *p*H method of statement, objecting to my plan in part as a result of taking more seriously than they were intended, some remarks of mine as to the ability of plants to recognize logarithms.

"The disadvantages of this new method of stating reaction seem far outweighed by its advantages. The scientist can readily translate its terms into *p*H or any other sort of values when he so desires; the layman finds the reverse procedure difficult or in most cases impossible. The numbers, while slightly more complex than those of the *p*H system, do not often go beyond thousands in the ordinary solutions most likely to be met. This method recognizes the presence of both acidity and alkalinity, instead of emphasizing the one at the expense of the other. It is surely more desirable than a plan in which the relative magnitudes of acidity and the numbers expressing them run in reverse direction, and in which these numbers, being actually logarithmic, permit even prominent scientists to misinterpret experimental data by using them as if they were arithmetically related. In spite of the objections which have been raised against it, then, I still feel justified in urging the wider adoption of this new plan of statement of acidity and alkalinity."

Although the basic principle of tenfold relationship of one *p*H unit to the next is generally known, this fact is rarely appreciated when *p*H data are interpreted.

Fig. 1 has been prepared from Dr. Wherry's tabulated data. This includes the portions of the alkaline and acid ranges in which pulp and paper makers conduct most of their processes.

From the paper maker's standpoint it is important to realize that within a single *p*H unit, from 7.0 to 6.0, there is but a minor increase in active acidity. This increase, arithmetically expressed, is from 0 to 10 i.e., 10 units of acidity per liter. Between *p*H 6.0 and 5.0 there is a greater spread, namely from 10 to 100, or 90 units of acidity per liter. The interval between *p*H 5.0 and 4.0 represents a similar tenfold increase over the previous interval. This interval, a span of 900, is surely great enough to be impressive as will be noted from Dr. Wherry's table and the above graph. For example, where *p*H 4.6 prevails, the active acidity is 250; at *p*H 4.3 it is 500. This difference of 0.3 *p*H corresponds to 100 per cent difference in active acidity. Too few paper makers realize that there is one hundred times as great intensity of acidity at *p*H 4.0 as there is at *p*H 6.0.

Active acidity should not be confused with total

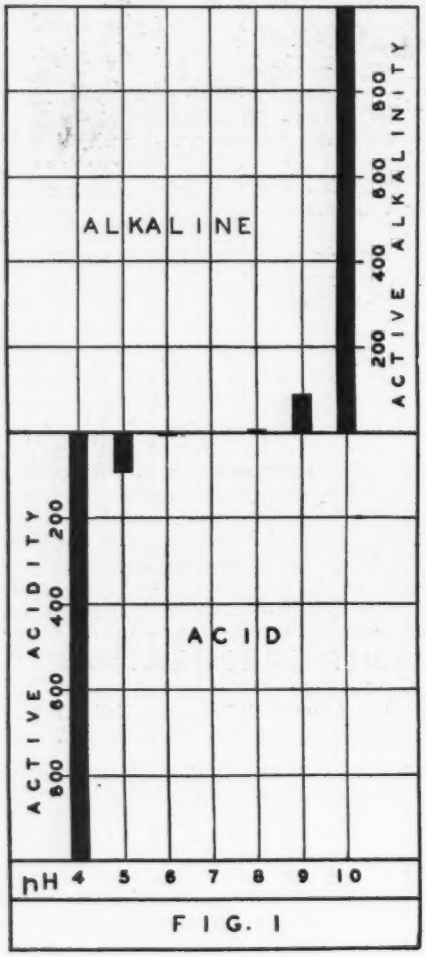

FIG. 1

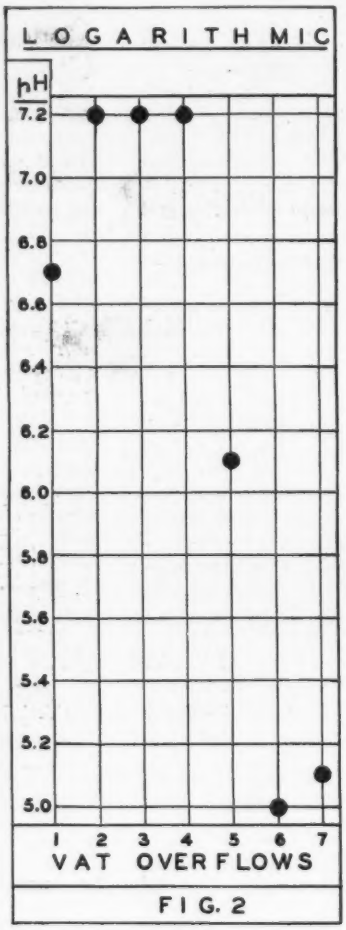

FIG. 2

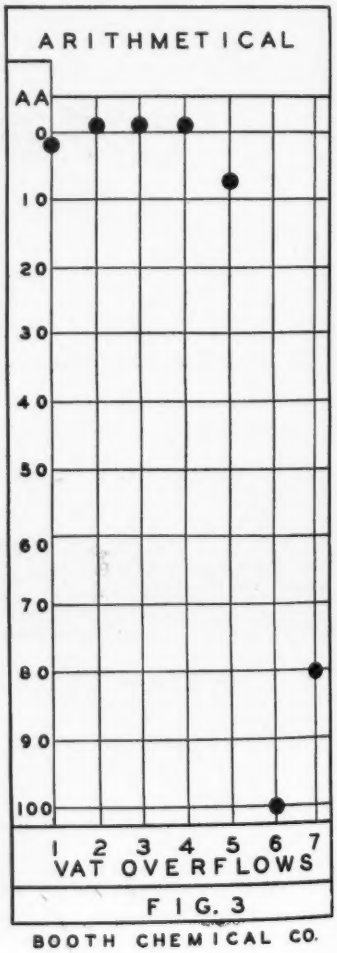

FIG. 3

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acidity, a titration measurement employed in water analysis. The utility of the latter test in paper making, especially sheet formation, has been discussed by Booth *(12) (13)*.

If a standard for water at the point of sheet formation has been set at *p*H 5.2 corresponding to an active acidity of 63, and the operator finds, on testing, a value of *p*H 4.9 (AA 125) he should be shown that 62 units, or twice as great intensity of acidity as wanted prevails. A deviation from the standard of 0.3 *p*H in the other direction, namely, to *p*H 5.5, corresponds to only 31.5 units, or one-half of the acidity desired.

One reason why many of the frequently experienced variations of acidity in paper making systems are tolerated, is because those in charge do not recognize the magnitude of the variations. A difference of 0.3 *p*H seems to be a trifling matter. However, 100 per cent more acidity, or 50 per cent less acidity, are obviously major variations.

Very often one must consider test data which include both active acidity and active alkalinity readings. It is proposed to adopt the symbol AA to designate both acidity and alkalinity. These letters are the logical abbreviation for both active acidity and active alkalinity. For the purpose of differentiation between the acid and alkaline phases, the arithmetical numbers representing alkalinity are preceded by the minus (—) sign, for example:

pH	AA
4.0	1,000
5.0	100
6.0	10
7.0	0
8.0	—10
9.0	—100
10.0	—1,000

If a worker is apprehensive lest the expedient of using the minus (—) sign may be confusing, where active alkalinity is to be reported, he may specifically indicate it as such when reporting in that part of the AA range.

Both paper machine performance and paper quality are dependent upon the hydrogen (and hydroxyl)-ion content of the water with which the sheet is formed. It is therefore desirable to fully appreciate these characteristics. Figure 2 illustrates logarithmically, in the conventional manner, a series of *p*H readings from a seven cylinder paper board machine. In this instance the sized liner was run in vats No. 6 and No. 7.

The *p*H and equivalent AA tests of the vat overflow waters were as follows:

Vat No.	pH	AA
1	6.7	1.5
2	7.2	—1.0
3	7.2	—1.0
4	7.2	—1.0
5	6.1	8.0
6	5.0	100.0
7	5.1	80.0

Fig. 2 does not clearly disclose the respective acidity values. Besides it does not present an intelligible picture of the relationship of the test readings. An erroneous interpretation of such a graph is apt to result because the ordinates are not arithmetical values but represent reciprocals of the logarithms of the hydrogen-ion content. This form of presentation stresses too strongly the minor differences of hydrogen-ion concentration prevailing near the neutral point. It also minimizes the major differences in the ranges which are remote from the neutral point. On a yard stick any inch is equal to any other inch. Such simple relationship does not prevail on the *p*H scale.

In Fig. 3 the same data are set forth but with AA values as ordinates. Since these latter are direct arithmetical measurements of acidity and (negative values) alkalinity the graph constitutes an explicit disclosure of the facts. There is no likelihood of obtaining an incorrect impression of the meaning of test data which are portrayed in this manner. It will be noted that the pattern of Fig. 2 is materially different from that of Fig. 3.

Since hydrogen-ions are important factors in paper making, the extent of their presence should be clearly visualized. There is no advantage in clinging to a system which tends to hide the facts.

The paper maker must realize, as Alexander *(14)* has stated, that: "The expression *p*H demands some explanation. It is a convenient way to express reaction of any fluid, but is dangerous because it does not do this directly, because it is an inverse logarithmic function, deprived of its minus sign . . .".

No explanation is necessary if we express results in units which are direct arithmetical expressions of acidity and alkalinity. Of course, when an operator is maintaining the specified *p*H value, it is unnecessary to make any calculation or appraisal. However, when conditions prevail which result in a variation from the *p*H standard which has been set, the operator should be taught to appreciate the extent of difference between the standard and any deviation from it.

One advantage to be expected from the use of the arithmetical mode of expression is closer adherence to specified standards, because numbers of appreciable magnitude are more impressive than merely tenths of *p*H units. Water analyses, in terms of parts per million, are far more informative than the same data expressed in percentages with several ciphers between the decimal point and the significant figure.

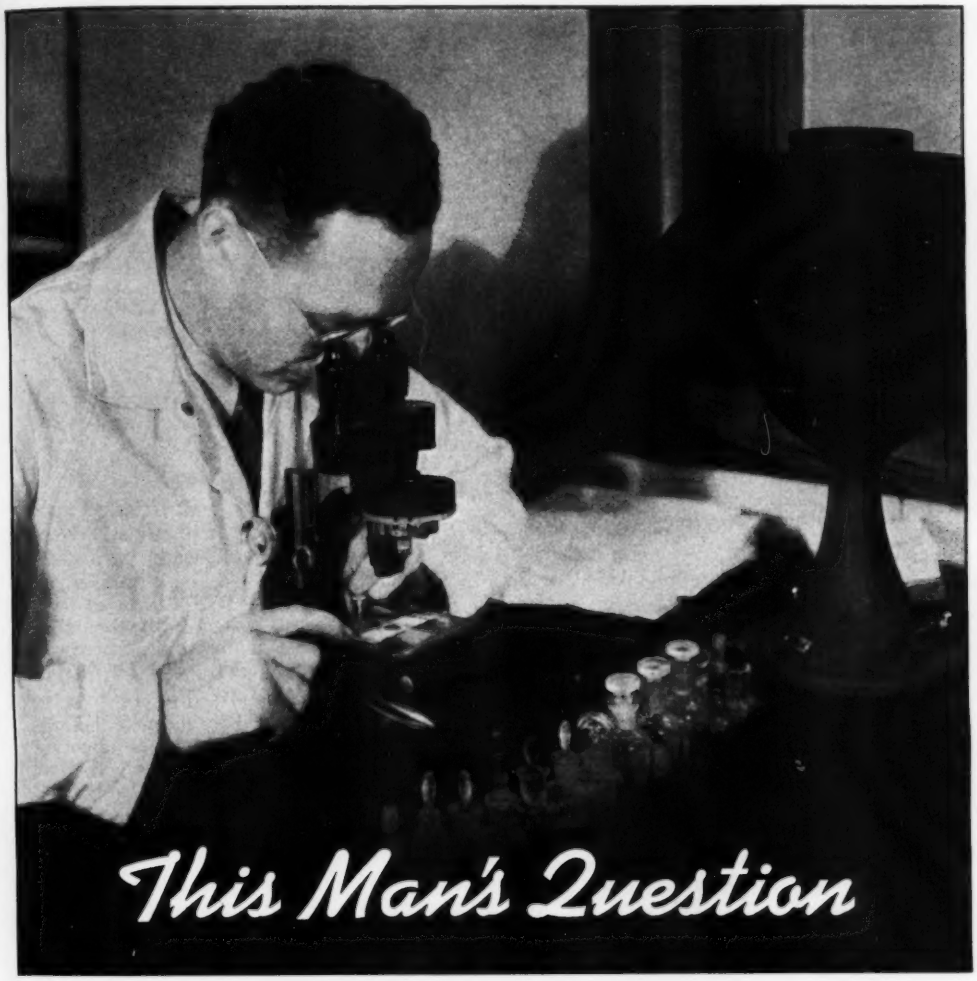
The query arises—why bring the matter up at this late date when we are all accustomed to using *p*H units? The answer is that, of those who make or hear about *p*H tests, there are relatively few who visualize at a glance the true significance of the logarithmic data. For intelligent procedure in any field the meaning of test data should be plainly discernible.

In 1912, when Walker and Kay *(6)* proposed an arithmetical plan to their fellow scientists, only a few were concerned with *p*H measurements. Now that the test has been popularized, with hundreds of thousands in many branches of applied science and industry attempting to interpret *p*H determinations, it is more important than before to realize the advantage of the arithmetical mode of expression. The greatest benefit from adopting the simpler method will be derived by generations of non-technical men of industry, who as yet, are unborn. They will be spared the bother of trying to learn the ins and outs of an unduly complicated system.

During the transition period *p*H determination outfits may be advantageously equipped with both logarithmic and arithmetical scales.

Those who hold the *p*H system of logarithmic statement in high esteem should be reminded that the progress of science and industry does not depend upon adherence to a complicated system of reporting test data, no matter how widespread its use. A confusing system tends to retard advancement.

Hydrogen-ions and hydroxyl-ions are phenomena which exert important influences in chemical process.



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It is therefore desirable to express the test data in the form which may be most readily comprehended.

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The Operation of An Adka Save-All*

By E. N. Poor[1]

Abstract

An explanation of the Adka Save-all and its application in a paper mill.

Early Developments

When paper manufacturers realized the extent of their losses due to white water disposal, they took steps to correct the condition. With the growing necessity of effecting economies at every possible point in the mill, came the pressure brought by certain health organizations regulating the pollution of streams in various parts of the country. As result it can be truthfully stated that today, paper mill operators are actually waste conscious.

Progress in the Mill

In the mill which this paper concerns, the first step consisted of segregating the white water from the couch pit and the fourdrinier wire for use as beater make-up. While this system recovered large amounts of valuable materials, it represented only a partial recirculation of machine water, and led to difficulties as regards dirt and slime formation. At this time (about 1920) various save-alls of the filtering or sedimentation type were coming into general use, and each machine was equipped with one of the former. The advantage of these was the fact that they returned the recovered material directly to the paper machine. However, while netted great savings, they were far from efficient, for the loss still amounted to 5 to 8 per cent of paper produced. Then came the formation of a colored and a white system, in each of which the effluents from the machine save-alls were again treated in a similar appartus. At this point it was agreed that additional treatment in mechanical save-alls would not be practical, so attempts were made to develop a closed system. No appreciable progress was made in this regard until the introduction of slime control, which is comparatively recent in development.

Up to this point, only the water most rich in materials was considered and that largely from the standpoint of economy. Since 1931 the pressure of those organizations regulating pollution has become evident, leading to consideration of all solid containing water at the paper machine. White water and individual shower systems were installed, suction roll and press effluents and all machine water, including wash-ups, were segregated at one point to be treated as a single unit. Before this final treatment, the loss amounted to 2 to 3 per cent of paper produced. With the installation of an Adka save-all as the last step in the recovery system, a great decrease in loss has been realized.

The Adka Principle

The principle of the Adka save-all is based upon the rising of solid particles loaded with air at reduced pressure. When air is mixed with water part of the air dissolves and part remains as free air bubbles. It has been found that these free bubbles are so large that they rise rapidly to the surface of the water without attaching themselves to any solid matter present. If a vacuum is applied above the water, minute air bubbles form, due to the decreased solubility at the reduced pressure, and they tend to cling to the suspended materials. However, it has become apparent that in most white water some particles were so small that even the minute bubbles would not adhere to them. Thus it was necessary to resort to chemical means to coagulate or flocculate these fine particles.

Actual Operation

While the operation of the Adka save-all has recently been published in detail, *(2)* I shall review the article for the benefit of those unfamiliar with the subject. The white water to be treated is forced through an injector at high velocity where it is continuously mixed with air and chemicals and then enters an open flow box in which undissolved air is permitted to escape as froth. The mixture, flowing through an enlarged channel where, due to decreased velocity, flocculation proceeds freely, is drawn up into a sealed tank in which a partial vacuum is maintained. As the pressure gradually diminishes, the dissolved air begins to separate as minute air bubbles, which adhere to the flocs of solid particles carrying them to the surface of the water. As this separation takes place, the clarified water flows radially toward the outside of the tank and into the outlet tubes, inducing a continuous syphon action through the save-all. A slowly revolving vacuum nozzle inside the tank removes the layer of solid matter to any desired point in the manufacturing process. The nozzle also maintains the air balance in the water, eliminating excess bubbles which did not escape previously.

Chemical Treatment

In view of the limited amount of research which has been carried out concerning chemical flocculation, I feel that the choice of the optimum type of treatment is the most obscure aspect of the system, and one offering the greatest opportunity for continued investigation. We have found various kinds of flocculating agents, all of which produce satisfactory

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[1] Member TAPPI, Chemist, W. C. Hamilton & Sons, Miguon, Pa.

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results under certain conditions—these include alum, rosin, caustic soda, sodium aluminate and glue. The most consistent operation has been obtained by use of saponified complex soaps, which are particularly versatile in their application.

The mechanism of all chemical flocculation operates on the same general principles in that a means is provided for allowing the solid particles to come in contact with each other repeatedly until they coalesce to a suitable size. The average white water being treated contains 3 lb. per 1000 gals. Sulphite and rag fibers, clay, talc, asbestine and titanium. With the use of soap to an amount equivalent to 0.05 per cent of entering water, insoluble compounds are formed by reaction with aluminum present, flocculating any solid particles present. The formation of these products makes possible the loading with air which produces the tendency to rise. Specific gravity has an effect only insofar as it concerns the fiber and filler properties themselves. Under the conditions of the above treatment, the average effluent obtained analyzes 0.2 lb. suspended solids per 1000 gals. It is true that fiber is more readily floated than filler, but mixtures containing up to 85 per cent of the latter have been satisfactorily handled. The use of soap flocculation has the definite advantage of producing clarified water at *p*H values of 6.7 to 7.0 which is an asset from a stream pollution, as well as a re-utilization standpoint. Up to the present time no attempts have been made to utilize the Adka effluent.

Effect on Color

In general, with the regular soap treatment, it is possible to recover a large portion of the coloring matter, and produce clarified water bearing light tints only. However, when excessive amounts of filler are present, color removal is difficult, due to some form of dye adsorption or absorption. Flocculation of white water with caustic soda and sodium aluminate forms aluminum hydrate which has great affinity for the more common dyes. The resulting aluminum lake is floated with the recovered material and practically colorless effluents result. As seen in the accompanying table, the cost of these chemicals ise xcessive.

Effect on Biological Oxygen Demand

The decrease in cellulose content through the Adka save-all is, of course, accompanied by a change in biological oxygen demand, but, in addition to this, another factor must be considered. As mentioned previously, the soap reacts with chemicals in the entering water. Experimentally we have found that nearly all of the agents, used in the treatment is removed with the recovered material. This means a decrease in dissolved solid content through the apparatus. Table I indicate the magnitude of this change. Recent analyses of b. o. d. have evidenced a reduction of 50 to 75 per cent. In this connection I would state that generally small amounts of alum and rosin are used with soap offering possibilities of direct savings in beater furnish. Since our recovered material is bleached we have been unable to evaluate such economies. Referring back to dissolved solids it is rather significant that under certain conditions when alum and rosin are used alone, no reduction in these solids is obtained, indicating a different type of flocculation.

Efficiency and Flexibility

With the many changes of furnish on our five paper machines, a variety of Adka feed conditions prevail. Under normal machine operation with inlet waters of 3 lb. per 1000 gals. clarified water containing .05 to .2 lbs. results, representing efficiencies of 94 to 98 per cent. The lowest value recorded was 0.006 lb. Feeds containing 1 to 20 pounds analyzing 15 to 85 per cent filler have been treated satisfactorily. Up to the present we have been unable to discern any effect of the kind of entering material on the fiber content of the effluent. However, the amount of filler leaving the Adka varies to a greater extent and we attribute this to the presence of the adsorbed coloring material which definitely makes filler flotation more difficult. Under such conditions we have investigated the advantages of increasing the fiber-filler ratio in the entering water with the hope of obtaining a greater buoyancy effect. I believe improvement can be made in this way but our variations have not warranted such action. Changes of furnish on the paper machines are the greatest factors affecting operation, but, with the flexibility of concentration and analyses of the entering water, no visible change in operation occurs when one or two machines are undergoing complete wash-ups. Under the rare conditions when more than two are changing, the chemical treatment necessarily must become more drastic. During the average day the Adka functions continuously with only an hourly numerical recording of effluent clarity.

Conclusions

In conclusion I would state the advantages of the Adka save-all thus far determined:

1. Efficiency of 94 to 98 per cent.
2. Continuous return of recovered material to the manufacturing system.
3. Flexibility during changes of machine furnish.
4. Clarified water suitable for re-utilization.
5. Possibility of continuous operation with little attention.
6. Low maintenance.

ACKNOWLEDGMENT

The writer wishes to express his appreciation for the cooperation of F. P. Lassiter, of the Dorr Company and R. Tutt of the Peter Cooper Corporation.

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TABLE I.

		Adka Feed			Effluent				
Type of Furnish	Chemicals	Lb./M.G.	Fiber, Per cent	Dissolved Solids, p.p.m.	Lb./M.G.	Fiber, Per cent	Dissolved Solids, p.p.m.	Efficiency, Per cent	Chemical cost 24 hours
Sulphite—rag	Soap-alum	8.9	38	...	.04	15	...	99	$7.50
Clay-talc-asbestine	Soap-alum	13.6	43	...	.14	20	...	98	8.50
(Titanium)	Soap-alum	15.8	44	...	.49	22	...	97	8.50
	Alum and rosin	1.1	40	500	.042	16	495	96	8.50
	Alum and rosin	4.7	36	425	.20	30	421	96	10.00
	Soap, alum and rosin	2.4	50	400	.046	38	244	98	9.00
	Soap, alum and rosin	3.0	30	...	.40	20	...	87	8.50
	Soap, alum and rosin	4.5	40	395	.20	30	250	96	12.00
	Soap, alum and rosin	3.0	20	...	.006	5	...	99.8	8.50
	Alum and rosin	2.5	30	450	.01	20	300	99.6	6.50
	Alum and rosin	5.3	31	...	.40	21	...	93	7.00
	Caustic soda	4.0	30	...	.01	25	...	99.6	17.00
	Glue-rosin-alum	1.4	34	...	.04	..	...	97	12.00

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Cylinder Machine Head-Boxes*

By Philip H. Goldsmith [1]

Abstract

Cylinder machine head-boxes have remained in a very crude state of development. Their twofold purpose is to furnish a steady head for feeding the vat and to remove entrained air. Mixing is inconsistent with these main functions and should be accomplished separately. Most head-boxes today are so faulty in design that they fail completely to accomplish their functions. This results in serious operating losses.

A simple streamlined head-box is described which is designed to furnish a steady head for vat feed and to remove entrained air. Various methods of mixing are given and a preferable method is described.

The neglect of the important functions of the head-box is typical of other defects in the vat system which are now receiving more general recognition.

Relics of a Bygone Day

Behind each vat of a cylinder machine stands a receptacle variously termed the head-box or the mixing-box. It is usually little more than a rectangular wooden box from which the underfeed pipe leads to the inlet of the vat. The new stock coming from the screen, white water from the fan pump, and the circulating stock, if the vat happens to be of the overflow type, are dumped into this box.

As we pass behind the machine and see the stock slopping around in the head-boxes and over them, long familiarity leads us to accept these crude devices as a natural part of the machine. When we think back over the history of paper making, we must honor the paper makers of every period for their struggles to make paper with any means at hand. We must regret, however, our failure to improve their tools. Considering the equipment that paper makers are often given to work with, and contrasting this equipment with the results they are expected to accomplish with it, we are tempted to think that heroes are not born but get into paper mills by mistake.

Many improvements have come into the paper industry recently, often from other industries. For example, we now use precision gears and anti-friction bearings, but the same old head-box continues to splash in its ancient way.

Functions of the Head-Box

The real purpose of the head-box is twofold: First, to furnish a steady head for feeding the vat; second, to prevent air entrainment and to remove entrained air.

The liquid level in the vat will rise and fall with that of the head-box. A large head-box surface absorbs and irons out any irregularities of flow coming to it. Therefore, the free surface should be large and quiescent. The dam over which the large quantity of dilute stock passes must be as long as possible for quiet flow.

Near the surface, the flow should be upwards and quiet in order to remove air successfully. To prevent air entrainment, there can be no "cascading" or turbulence, and the downward flow should start slowly.

Good mixing requires turbulence and, therefore, obviously demands exactly opposite conditions to those which are dictated by steady feeding and air removal. Will some master-mind please tell me how the same head-box can be expected to accomplish such diametrically opposite purposes? On the other hand, it is an easy matter to secure good mixing before the flow reaches the head-box as will be shown later.

An Improper Design

A natural, though primitive, first approach to the problem was to simply drop the various flows into a box for feeding the vat. Quantities of flow were small in those days but have increased tremendously since.

It was found that much of the air entrainment could be prevented by submerging all pipes discharging into the head-box. This procedure became common and of course helped considerably, but operation was still far from satisfactory.

In an effort to fed the machine more steadily and further reduce foam, the tendency has been to increase the sizes of head-boxes. This in turn has brought more trouble by preventing good mixing of the stock.

The head-box illustrated in Fig. 1 is not the worst type in use today, and most machines are equipped with head-boxes which function no better.

You will observe three separate pipes discharging side by side into the box. The first carries new stock from the screen at a consistency of about 0.4 per cent; the second carries clear white water from the inside of the cylinder mold; and the third carries overflowed

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[1] Member TAPPI, Engineer, Robert Gair Company, Inc., New York, N. Y.

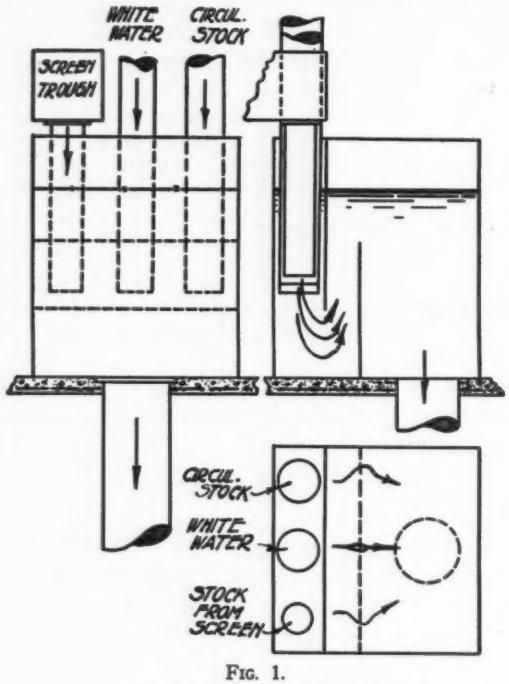

FIG. 1.
An improperly designed head-box.

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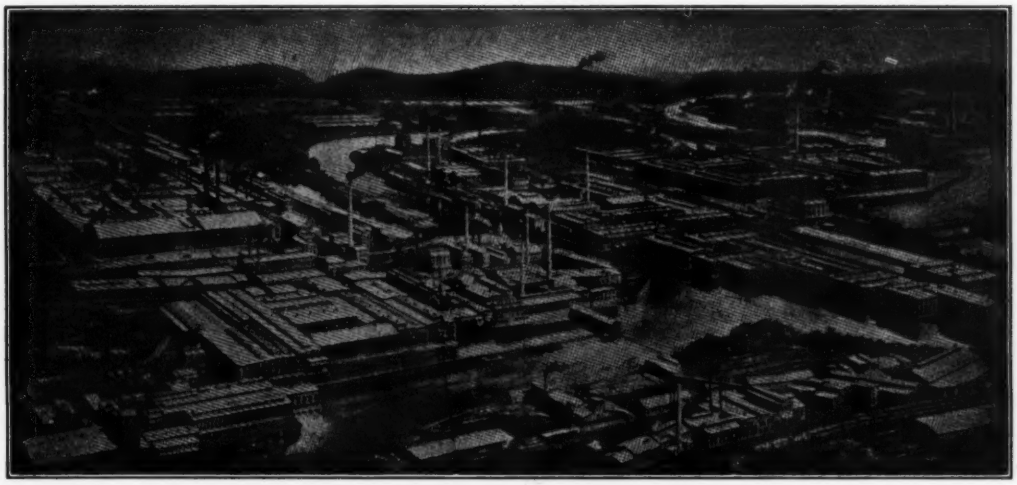

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circulating stock at about vat consistency. These three flows are all shot downward in the first pass, which is separated from the remainder of the box by a baffle. The surface of the first pass is, therefore, completely ineffective for feeding the vat since only the free surface can come into play. This first pass is a dirt-catcher with a dead pocket above the pipe discharges.

After the first pass, a bottom baffle forces the flow upward, still side by side and unmixed. After the second or upward pass, the stock runs into the third chamber and then to the underfeed pipe. Large dead spaces are left in all the corners.

In these days, underfeed pipes must be of large diameter. Consequently, the different consistencies of stock "streak through" to the machine. The results are very marked differences in weight of sheet across the machine. Narrow heavy streaks also occur. The sheet cannot be maintained level for weight. Slime spots, couch crushes, and calender marks are also in evidence, not to mention breaks. These troubles are very costly in the aggregate and are traceable in part directly to lack of mixing. In addition, heavier stock segregates or is "thrown down" in the corners.

Even all-metal head-boxes follow this same general arrangement for no other apparent reason than slavish imitation of wood construction. Such a box requires the additional cost of metal construction without reaping the advantages of the new material.

To satisfy yourself on these points, it is only necessary to attach a test bottle to the end of a stick and fasten a cord to the stopper. You can then obtain samples of stock from submerged points.

What will these tests show you? You will find marked differences in consistency. You can, in fact, expect nothing else since no proper mixing has been done. You will further find that, even were the stock properly mixed, the dead corners segregate pockets of heavy stock. When these causes are removed, the resulting machine troubles disappear.

This type of box also produces much turbulence, keeping its surface in constant upheaval. The vat level must rise and fall since we are still subject to nature's laws, and hence the sheet will show weight variations in the machine direction as well. In addition, the turbulence produces serious and quite unnecessary foam troubles. This type of head-box is a complete success in preventing the achievement of any one of its purposes! One wouldn't believe such a design were possible, but there it is.

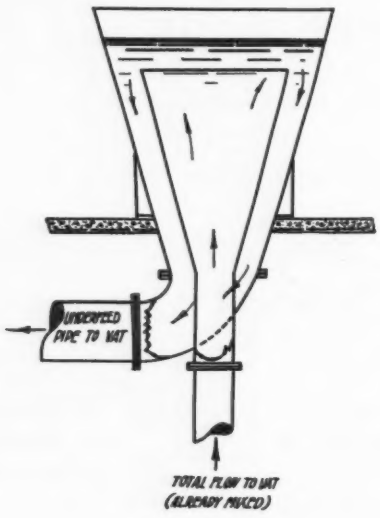

FIG. 2.
Streamlined head-box.

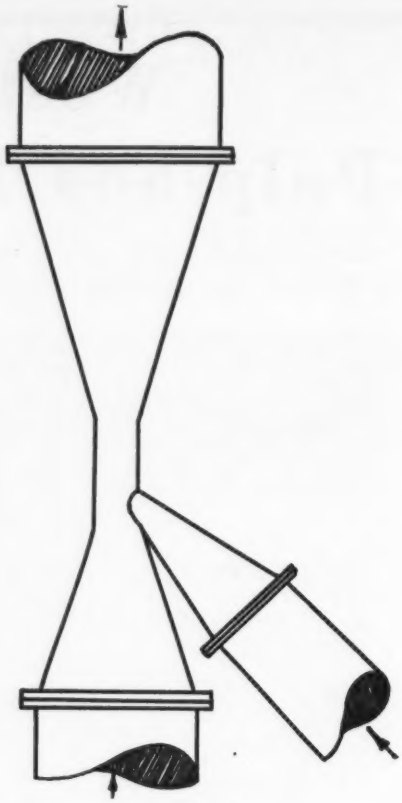

FIG. 3.
Flow mixer.

A Simple Design

If the elements of this problem are kept clearly in mind, it is not difficult to arrive at the logical and proper solution. A head-box which performs its functions efficiently is illustrated in Fig. 2.

This is a conical "up-flow" head-box. It consists of an inner and outer cone. The circular area at the top of the inner cone is equal to the annular area between it and the outer one. The flow is upward in the inner cone. The usual height of the free liquid surface is such that the area of flow across the top of the inner cone is equal both to the circular area of the upward flow and the annular area of the downward flow. The entire top of the inner cone forms a circular dam or baffle. The underfeed pipe connects to the bottom of the outer cone.

The whole liquid surface is effective for steady feed. The incoming flow is upwards and its velocity is progressively reduced. The long circular dam and large flow areas at the top cause a very quiet flow. Here we have ideal conditions for steady feed of the vat. We also have the most favorable conditions for air removal. What we actually have achieved is complete harmony in our purposes.

The quiescent surface and the initial low velocity of downward flow prevent air entrainment.

The entire operation is "streamlined" and is able to start a uniform flow, such as is needed in approaching

the vat inlet. There is neither turbulence nor dead space to segregate the stock. Its uniformity of dispersion is maintained. Finally, you are giving your machine tender a head-box which is easy to wash up. All these elements have been thoroughly tested and proven successful in various mills.

A Superior Mixing Device

Thorough mixing is necessary to produce a uniform sheet of equal weight in all directions. *(1)* It should be evident that such good mixing requires the uniform and intimate interchange of small parts of the substances to be mixed. There are three ways in which this can be done.

First, the various components of the flow can be brought together in a restricted and properly shaped turbulence chamber. The flow must be made uniform and quiet again thereafter.

Second, mechanical means can be employed. For example, all flows can be fed to the suction of the same pump.

Third, the separate elements of flow can be joined at a point where their cross-sectional areas are small and their velocities high. This brings small quantities from each of the flows in close contact with each other.

The last named method is employed in the Constricted area type of flow mixer illustrated in Fig. 3. The two or more parts of the flow are brought together by a pipe connection of special design. In order to produce an extremely intimate mixture, the area of the joined pipes is reduced at the point of connection. In this manner, each element of flow is increased in velocity and "stretched out," so to speak, to allow "narrow" flows to join and become thoroughly intermingled. The constricted cross-section is continued for a sufficient length to permit complete mixing before the area is again gradually increased. This constricted length also suppresses the sidewise velocity of the "branch flow," which might otherwise throw the branch flow toward the side opposite to that of its admission. You will note that the "increaser" section is longer than the "reducer" section. The reason for this is that velocity can be increased quickly with no ill-effects. Velocity reduction must be more gradual to produce uniform conditions across the pipe.

Probably everyone has had occasion to find out that an ordinary lateral pipe connection will give a fair mixing of flows, especially if the pipes are rather undersized for the volumes handled. By making the area of each of the pipes where they join from one-fifth to one-tenth of their respective normal pipe areas, extremely good mixing is accomplished. At the same time pipe friction and pumping power are kept low by maintaining proper pipe sizes, except at the mixing point.

When you consider how extremely important this question is to good machine operation, it is amazing how generally the basic facts of mixing are ignored or not even thought of.

As previously stated, the mixing operation should be accomplished ahead of the head-box. This type of flow mixer does an excellent job and requires no additional space since it is placed in the line supplying the head-box.

Entire Vat Section Needs Improvement

The reason for my choice of the topic "Cylinder Machine Head-Boxes" is the belief that this item of equipment illustrates the haphazard design and loose thinking underlying much of our present paper machine practice. The entire vat section needs and is receiving similar simplification and improvement.

Note: Steps have been taken for the full protection of all devices mentioned in this paper.

Literature Cited

(1) Goldsmith, P. H., "Cylinder Formation", *Tech. Assoc. Papers*, 21:121-134 (1938).

Scheduling Paper Mill Operations*

By Charles F. Moreau[1]

Abstract

Scheduling is a definite part of production Control. The physical and technical factors to be dealt with are developed. Scheduling to meet seasonal variation and rush shipment is discussed. Advantages of preplanning production are shown.

Scheduling paper mill production is a definite part of one of the most important functions of management—production control. Production control means that under the jurisdiction of one man or department are grouped the necessary facts and processes by which the output of a mill can be localized. Therefore, in order properly to consider scheduling of production attention must be given to certain other necessary factors.

We will first consider a means of presenting the picture of production that is to be turned out by the mill. A very easy and informative method is to use an order register. In this particular journal can be booked all the various customers and on each customer's sheet can be catalogued the various orders that are to be produced for him. These orders will be recorded with information given as to the type of product to be made, the tonnage involved, shipping dates, point of delivery and any other pertinent information. It is also necessary to have some means, preferably a filing system known as a perpetual inventory system, by which complete inventories can be booked. This will refer to regular stocks on hand, job lots, inventories in process, and any other knowledge concerning products which may be required to fill orders. Definite forms are required to give the production man information as to what he has scheduled on machines and through the various mill departments. With this information at hand and with any information he needs due to the peculiarities of the mill he is scheduling he is then ready to work from day to day on a basis that will enable him to keep the management and the operating executives in touch with all items that are being produced by the mill.

There are, too, certain peculiar and technical functions that must be taken into consideration before pro-

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duction can be mechanically scheduled. It is necessary at all times to obtain the maximum trim that a machine can produce. Several facts influence this machine trim. The condition of the machine clothing must always be considered and by that we mean the condition of the wires, felts, drier felts, the size and type of wire that is on the machine at the present time, condition of press rolls, etc. Another very important factor is the condition of the calender rolls if the machine is equipped with a calender stack.

The establishment of proper color sequences is another very important element in production. To illustrate, let us consider that a mill will make a complete range of colors once a month. The first week of the month can be devoted to colors which contain yellow bases, such as canary, goldenrod, and the like. The second week can be made of red color runs, the third week of blue and green, the fourth and fifth weeks left open for miscellaneous and dark colors. By using such definite color sequences, a maximum amount of broke can be reworked, the sales department will know when definite colors are coming up for manufacture, and inventories can be planned to a minimum because there is always definite knowledge of when a certain color will be made.

The variation in weight basis is also an item of great importance. Production should be considered so that the minimum change in weight will be attained; that is, the light weight substance can be run first and gradually be worked up to making the heavier weight items, or it is possible to start with the heavier weights and work down to the lightest, but it is necessary at all times to avoid changes from light to extremely heavy weights, back to medium weights, etc.

In considering these above items we have checked the important basic facts to remember in scheduling a machine.

Paper Finishing Operations

In passing from the paper machine proper to the other machines that are used in finishing or completing the product, it is necessary to consider the proper sizes that will give maximum efficiency in operating these machines. To illustrate, we can consider a sheet cutter that will trim a sheet 75 inches wide. A roll should be obtained from the paper machine that will give as near as possible the maximum width obtainable on the cutter and at the same time produce a good trim for the paper machine itself. The same is true with calenders, rewinders, or any other machines used in the finishing operation.

To provide for shipping and delivery of orders it is necessary that these reach the shipping room at the right time and, therefore, the shipping room foreman should be provided with information that will tell him at what time he is supposed to ship orders and also what orders are to be used in making up pool cars, less-carload shipments, and shipments that will move in any other manner. To perform all the functions listed above it is necessary to give every order entered particular attention, and orders should be combined wherever possible to produce long runs which in turn will give maximum efficiency.

In order that all necessary supplies be at hand when production is passing through a department, the production chief will find it necessary to control the supply departments. The box shop must be ready with its supply of cases, skids, crates, etc. The purchasing department must have all outside produced materials ready at the correct time. Labels, wrappers, certain raw materials are referred to here.

Long Time Planning

The above mentioned points will pretty well carry out the mechanical operations in scheduling paper mill production and will provide a basis for everyday operation. However, some mills find it necessary to schedule their operations at a greater length than from day to day or from week to week. This is necessary to avoid peaks in production. Therefore, after due consideration of sales department budgets and previous records of operation, it is feasible and wise to consider production over a long period of time; i.e., six months or a year. By doing this it is possible to put machines into operation continuously by building up inventories and then shipping them as the customers desire. At times mills find it necessary to make hurried shipments when called upon by their sales outlets and in order to meet this condition it is wise to carry jumbo rolls in inventory so that odd sizes can be cut out and a customer's particular requirements satisfied.

Very often mills making certain grades and types of papers will find it necessary because of market conditions and for other reasons to take on tonnage that it does not regularly manufacture. Here the production department can readily produce the information as to what tonnage is desirable, when it will be needed, and can furnish general information that the management will need before finally making contracts.

The advantages to be obtained from a centralized production control system and from properly scheduling machines in production are very easily seen and realized. A minimum amount of inventory is necessary to meet customers' requirements because these inventories have been planned from previous experience and from sales budgets, and a minimum inventory also passes along the advantages of less capital invested in this important asset and also less factory space given up. Secondly, accurate scheduling will enable the executives to pass on to the sales department and customers the information as to when orders will be available and also when customers' requirements can be manufactured. Thirdly, correct scheduling will provide the labor relations department with information as to how large a personnel is necessary to carry out operations over a definite period, thus enabling them to have adequate labor supply on hand at all times. Fourth, a very important result of correct scheduling will be information to the purchasing department that will enable them to purchase in the most economical manner and at the same time carry their raw materials inventory at a minimum level.

Another point we have not mentioned so far is the intelligent use of production records. The labor relations department usually tries to reward personnel for efficient work and volume of tonnage produced. Production records will give this department the information they need to carry on this procedure.

In servicing customers the sales department will want information that is readily obtainable from production department records. Here I refer to production manufacturing dates, dates of shipments, routings, and all relative information.

Thus, in looking over the scheduling operations we can say that this is in fact a complete layout or portrayal of mill operation giving it its proper emphasis and technical application.

Problems in the Making of Sulphite Acid Introduced by the Use of Chip Packers*

By E. L. Lamb[1]

Abstract

Most sulphite mill operators recognize that it is desirable to use cooking acid of constant, relatively high free SO_2 concentration at all periods of the year, but the warm water used for acid making prevents this in many plants, and this situation is aggravated by the use of chip packers. An analysis of one acid plant which uses milk of lime in Barker towers showed that changing the tower packing, increasing the combustion chamber volume and cooling the water used for acid making to 10 degrees C. with an evaporative type cooler were the economical moves to insure acid of 6 per cent total SO_2 at all seasons, and experience confirmed this estimate reasonably well. The methods used in making the estimate are described.

Many sulphite acid plants are incapable of producing sulphite acid of as high excess[2] SO_2 concentration as is desirable for year around operating conditions. This is especially true of acid plants dependent upon relatively warm river water during the summer months, or where the pulp mill has been enlarged beyond the acid plant capacity so that the latter operates at a higher capacity than that for which it was designed. The result is that cooking schedules must be modified in summer, with an accompanying change in pulp quality, decrease in pulp output per digester, or both.

It is not surprising that sulphite mill operators do not agree among themselves concerning the desirable excess SO_2 concentration to employ in cooking, when consideration is given to the limitations imposed by the equipment in different mills, differences in the pulp quality requirements of various plants, and differences in the background of experience of the operators. Considering the industry as a whole, however, there does seem to have been a definite trend toward the use of stronger acid over the past few years. And while different operators may not agree about the desirable composition of acid, certainly the majority recognize the advantages in pulp quality uniformity, of either producing acid of the same composition the year around, or in mills where the wood supply varies seriously in moisture content, of being able to adjust acid strength at will to compensate for these variations.

During the period in which the advantages of strong acid have been generally recognized, many mills have installed chip packers, in order to obtain the decreased steam consumption and increased pulp production which are made possible by these machines. The adoption of chip packers in most cases has aggravated the difficulty of consistently producing high strength acid. When a chip packer is used, the volume of acid which may be charged to the digester is reduced, and the SO_2 returned with the relief is decreased, because the larger wood charge consumes more sulphur, so that the net effect is that more SO_2 must be dissolved in less acid if the acid composition in the storage tank is to be maintained. In addition to this effect, more sulphur must be put through the burners and towers, and this tends both to decrease the SO_2 content of the burner gas, and to reduce the effectiveness of the towers as absorbers.

A few years ago, the mill with which the writer is connected installed a chip packer in one of its sulphite mills. In anticipation of the adverse effect which this device would have on acid strength in summer, a survey was made of the acid plant in order to estimate what changes could be made to compensate for the effect of the packer, and make it possible to produce acid of about 6 per cent total SO_2 concentration the year around. The study led to a number of changes in the acid plant which now allow the production of acid of the desired concentration at any season.

The purpose of this paper is to describe briefly the methods which were used to predict the effect of acid plant changes on the acid composition which can be maintained in summer, and to indicate the magnitude of effect which some changes have on the performance of the plant, in the hope that this description will provoke discussion which may be helpful to others in solving similar problems. It seems unnecessary to point out that while the methods employed in predicting the performance of this acid plant would probably, with modification, apply to any plant, the actual remedial steps taken would not necessarily be the desirable ones in another plant involving different equipment and capacity limitations.

Statement of the Problem

A diagrammatic elevation of the acid plant in which the studies were conducted is shown in Fig. 1. Sulphur burned in conventional rotary burners is cooled and pumped through Barker towers by a vacuum pump connected to the tops of the Barker towers. The raw acid from the bottom of the towers flows through a packed absorption tower to the acid storage tanks, whence it is pumped to the accumulator continuously. Relief gases from the digester pass counter-current to the flow of raw acid through the accumulator, acid storage tank, and the reclaiming tower and are eventually mixed with the burner gases at the bottom of the Barker towers.

Obviously, if the SO_2 concentration in the accumulator is to be maintained constant, SO_2 from the

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[1] Member TAPPI, Oxford Paper Company, Rumford, Me.

[2] By excess is meant the amount of SO_2 in solution beyond that necessary to form bisulphite with the base, that is, total SO_2 minus two times combined SO_2 equals excess SO_2. It is that part of the SO_2 in the acid which exerts an appreciable vapor pressure.

burner gas must be absorbed at the same rate that it is removed from the system by reaction with the wood, loss up the vomit stack and through incidental acid plant losses. It follows from the laws which govern the absorption of gases in liquids that the amount of SO_2 which may be absorbed from the burner gas is dependent on the pressure, temperature, the effective absorbing area and the rate at which SO_2, water and inert gas are fed to the Barker towers. The amount of SO_2 feed to the Barker towers is dependent on the rate at which sulphur is burned, and the rate at which SO_2 is returned with the inert gas from the digester, which in turn, is dependent on the conditions of absorption in the accumulator, storage tank and reclaiming tower. Thus, from an academic point of view, the excess SO_2 content of the cooking acid might be increased by (1) increasing the burner gas strength, (2) decreasing the rate at which acid is made, (3) decreasing the temperature, (4) increasing the pressure in the Barker towers, (5) increasing the effective absorption area of the Barker towers, or (6) decreasing the amount of SO_2 returned to the Barker towers by decreasing the temperature or increasing the pressure or absorbing area in the train of absorbers through which the relief gas passes in going from the digester to the Barker towers.

From a practical point of view, some of these expedients to increase the excess SO_2 content of the raw acid are not feasible, or are uneconomical, and others are limited in degree by structural limitations. The rate at which SO_2 and water are fed to the Barker towers is set by the rate at which acid is used and sulphur is consumed. Increasing the pressure in the various absorbers would be limited to a small pressure increment in the acid storage tank and reclaiming tower by the expense of high pressure equipment, and the use of super atmospheric pressure in the Barker towers would not only necessitate rebuilding the towers but would present the problem of introducing burner gas into them under pressure. The effective absorbing area of the towers might be increased somewhat, it would seem, by increasing the area of the packing, but the extent to which this can be done is limited by the volume of the towers. The concentration of SO_2 in burner gas which may be produced in a given rotary burner installation is limited and is dependent on such factors as burning rate and combustion chamber volume. Study of the burning equipment offers the basis for some remedy, and a further step, of course, might be made by the installation of a spray type burner, which, it is understood, is capable of delivering gas at about 20 per cent SO_2 concentration. The remaining variable to be manipulated is acid temperature.

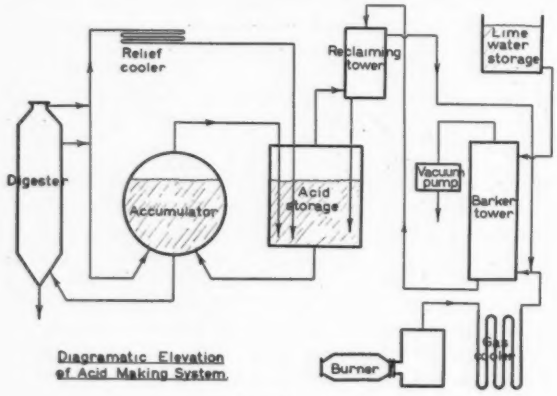


FIG. 1.

In a milk of lime system such as the one under consideration, the heat developed by slacking and the chemical reactions of making raw acid, plus energy dissipated by pumps will account for a rise of about 14 deg. C. above the temperature of the water used for acid making. Since, in general, the cost of cooling per degree cooled increases as acid temperature level is lowered, it would be advantageous to cool the acid at the higher temperature level after bisulphite has been formed, and before excess SO_2 has been formed rather than to cool the water. The serious problem which would be encountered in doing this would be in preventing calcium salts from coating the walls of the heat exchanger.

The problem, then, becomes one of estimating the lowest cost changes in the plant, working toward some combination of increased absorber efficiency, increased pressure in the absorbers, higher burner gas strength and cooling of the water used for acid making, which will maintain the cooking acid at the desired concentration during the most adverse conditions, which occur in late summer when the water used for acid making is warmest.

Method of Predicting Acid Plant Changes

Generally speaking, the method employed in estimating the effect of various acid plant changes on performance consisted of:

a. Establishing a material balance for water, sulphur, lime, and inert gas for the whole acid plant, over a period of several days for normal operating conditions.
b. Calculating the effectiveness of the various absorbers.
c. Setting up a new material balance for the finished acid concentration which it is desired to maintain.
d. Calculating various combinations of pressure, temperature and absorber efficiency capable of maintaining these conditions.

In the acid plant under study, it was possible to set up a material balance without installing any flow measuring devices, from tank measurements and gas and liquor analyses, provided certain obvious assumptions about flow of materials were made. These assumptions were:

1. That all of the water and lime charged to the Barker towers come through to the digesters.
2. That all of the sulphur charged to the burner is either consumed in cooking, or lost on blowing.
3. That the change in combined SO_2 concentration between the reclaiming tower and storage tank is due to water in the relief from the digesters or accumulator.
4. That all of the inert gas relieved from the digester is eventually lost from the system through the top of the Barker towers.

The picture of material flows obtained in this way is valuable principally in furnishing the basis for estimating the effectiveness of the absorbers in the train, and in locating the source and amount of inert gas which passes through the system. A value to characterize the absorptive effectiveness of the accumulator, acid storage tank and reclaiming tower was obtained by dividing the SO_2 pressure of the

liquor entering the absorber, as determined by analysis of the acid and the vapor pressure—concentration relations for sulphite acid solutions determined by Maass[3] and his co-workers, by the partial pressure of SO_2 in the gas discharged from the absorber, as measured by Orsat analysis. In the case of the Barker towers, a similar value was obtained by dividing the SO_2 pressure of the acid discharged, by the SO_2 pressure of the mixture of burner and "over" gas entering the base of the tower. The ratio of SO_2 pressures obtained in this way were considered to remain constant for any operating conditions which would be encountered commercially. This treatment of absorption coefficient is, of course, open to criticism because cognizance is not taken of the effect of the rate of flow of materials on the coefficient.

The flow of inert gas back through the system was established by analysis of the gas in the acid accumulator, and the change in gas and acid composition at each absorber. In this connection, it is of interest to note that a large volume of inert gas is relieved in sulphite cooking. The following table gives the results obtained in this survey in cubic feet at standard conditions, per ton of wood cooked.

Carbon dioxide	224	
Oxygen	18	
Nitrogen	118	(by difference)

In setting up flow conditions for other arrangements of equipment, the production of inert gas was considered to vary directly with the amount of wood charged, in accordance with the values in the table.

The next two steps, of setting up material flows for the desired operating conditions, and estimating the changes necessary to maintain these conditions in summer involved only arithmetic and do not warrant detailed description here.

Estimated Effect of Some Acid Plant Changes

While it is obvious that increasing the SO_2 pressure, decreasing the temperature or increasing the effective area of any of the absorbers would allow producing stronger acid in summer, the relative effect of such changes at various points in the acid plant is not apparent. In order to become oriented in this quantitatively, and to indicate the economical points for attack, flow conditions for 6 per cent total SO_2 were set up for the wood charge obtained without a chip packer, and some of the combination of changes which would maintain this condition in summer were estimated using the method of analysis just described. These are shown in the table.

[3] Gurd, G. W., Gishler, P. E., and Maass, O., Forest Products Laboratory of Canada Quarterly Review, No. 17: 7-8 (January-March, 1934).

COMBINATIONS OF ACID PLANT CHANGES CAPABLE OF MAINTAINING 6 PER CENT ACID IN SUMMER WITH UNPACKED DIGESTERS

Storage Tank Pressure	Reclaiming Tower Efficiency	Barker Tower Efficiency	Burner Gas Concentration	Raw Acid Temperature Required deg. C.
0	70	60	13	36
			15	39
			17	42*
			19	45
0	70	85	13	44*
			15	48
			17	51
0	85	60	13	37
			15	40*
			17	43
			19	46
0	85	85	13	42*
			15	46
			17	49
5 lb.	70	60	11	40*
			13	45
			15	47
			17	52
5 lb.	70	85	9	45*
			11	50
5 lb.	85	60	11	42*
			13	46
			15	50
5 lb.	85	85	9	45*
			11	51

Before any changes had been made in the acid plant, reclaiming tower "efficiency" was 70 per cent, Barker tower "efficiency" 59, the maximum temperature of the raw acid in summer 43 deg. C. and the maximum burner gas concentration which could be consistently produced about 14 per cent. These conditions were capable of producing a maximum acid strength of 4-4.2 per cent total SO_2 under the most adverse conditions. Based on this information, the combinations of changes which would assure 6 per cent acid in summer without cooling the water used for acid making, have been marked with an asterisk. By making a few cross comparisons, the separate effects of increasing the storage tank pressure, increasing the "absorbing efficiency" of the reclaiming tower or Barker tower, or increasing the burner gas strength can be expressed in equivalent acid cooling, with these results:

Increasing the pressure in the storage tank from 0 to 5 pounds gauge is equivalent to cooling the raw acid 9 to 10 deg. C.

Increasing the reclaiming tower absorption efficiency from 70 per cent to 85 per cent is equivalent to 1 deg. C. cooling of the raw acid.

Increasing the Barker tower absorption efficiency from 60 per cent to 85 per cent is equivalent to cooling the raw acid 8 to 9 deg. C.

Increasing burner gas strength from 13 per cent to 15 per cent SO_2 is equivalent to cooling the acid 3 to 4 deg. C., and further increasing burner gas strength to 17 per cent SO_2, is equivalent to cooling the acid 6 to 7 deg. C.

Obviously repacking the reclaiming tower, or replacing it with a larger one would offer relatively little advantage, and therefore, warrants little consideration. A pressure storage tank would exert a relatively large effect, as would improved absorption conditions in the Barker tower, and to a lesser extent, materially increasing the SO_2 content of the burner gas.

The Barker towers in the acid plant under study are packed in the lower part with wooden blocks about 4 inches square. The large advantage indicated for better conditions of absorption in the Barker towers prompted inspection of this packing, which revealed that lime incrustation was causing serious channeling of the acid. The blocks were removed and cleaned, and the device which distributes acid over them repaired, with the result that the "absorptive efficiency" of towers was raised from about 59 to about 67 per cent.

Additional Absorption Load Imposed by Chip Packer

Increasing the wood charge per digester by packing, as has been pointed out, increases the absorption load in the acid plant in two ways: (1) the additional wood occupies space, and so reduces the amount of acid which can be used; and (2) the larger charge consumes more of the sulphur added to the digester, which decreases the amount of SO_2 in the digester relief. To compensate for these effects, more sulphur

must be burned and dissolved in a smaller volume of acid at the Barker towers.

The magnitude of the increased absorption load which would be created by packing chips was estimated by the method which has been described, using as acid plant changes means for cooling raw acid and increasing burner gas strength. The plot shows the relation between acid temperature, and wood charge per digester to maintain 6 per cent acid in summer, when burner gas of 14 and 17 per cent is available. Prior to chip packing, a wood charge of about 31 tons was obtained, so that the 20 per cent increase anticipated would increase the charge to 37.2 tons. The plot shows that with 14 per cent burner gas, an acid temperature of 22 to 23 deg. C. would be required. Since the heat of reaction during slaking and acid making account for a temperature rise of about 15 deg. C.,[4] this means that the water supply for acid making would have to be cooled to about 7 deg. C.

A survey of the commercial types of refrigerators available which would be suitable for chilling water for sulphite acid making indicated that evaporative type coolers, which function by boiling water at a high vacuum produced by a steam aspirator, are capable of cooling water to 8 to 10 deg. C., and are considerably less expensive than the more conventional refrigerators which employ ammonia or sulphur dioxide. However the 10 deg. C. water obtainable from this type of machine was not quite cold enough to satisfy the estimated requirement for 6 per cent acid with packed chips, even without making any allowance for a "safety factor" to compensate for inaccuracies in the method of estimation. This directed attention to means for increasing the SO_2 content of the burner gas, which the plot shows, would allow the use of 10 deg. C. water for acid making if the concentration could be raised to about 17 per cent.

Before any changes were made, the two rotary sulphur burners were capable of producing SO_2 consistently at about 14 per cent concentration. Reducing the secondary air supply to increase the SO_2 content beyond 14 per cent caused sulphur to sublime and deposit in the coolers with an attendant increase in the pressure drop across the coolers, and the development of leaks. Experiments with the rate of burning indicated that reducing the rate of air feed to the burner one-third would cause an increase in the SO_2 content of the burner gas to about 18 per cent before sublimation took place at a rapid rate. From this it was reasoned that a higher SO_2 concentration at increased sulphur burning capacity could be obtained by increasing the gas retention time in the combustion chambers, in order to burn sulphur that otherwise would be sublimed. Consequently, new combustion chambers were installed which have a volume about two and a half times that previously used. This move resulted in raising the gas concentration to about 16.5 per cent, on the average, and make the installation of an evaporative chilling plant appear a safe additional remedy to the problem of maintaining acid of the desired concentration in summer.

[4] The heat developed in dissolving enough SO_2 for packed chips increases the temperature rise from water to raw acid from 14 deg. C. to 15 deg. C.

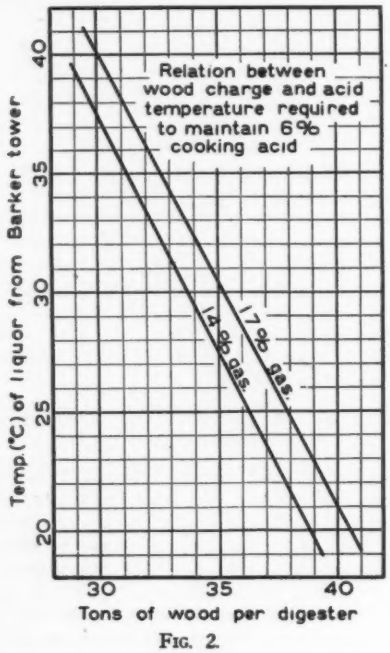


FIG. 2.

Accuracy of the Method Used to Predict Effect of Acid Plant Changes

The method which was used to predict that repacking the base of the Barker tower, installing new combustion chambers and cooling the water for acid making to 10 deg. C. would allow the production of 6 per cent acid in summer is admittedly crude, and is open to criticism on theoretical grounds. Mention has already been made that no consideration was given to the effect of rate of flow in measuring the performance of the absorbers. Another source of error derives from the fact that, while the rate of absorption of SO_2 in acid at the Barker towers decreases with temperature increase, the rate of reaction between the dissolved SO_2 and the base increases so that the proportion of the total volume of the tower available for dissolving gas in excess of that required to react with the base is a function of acid temperature. Any scheme of acid plant analyses which would weigh all of these factors would probably be so complicated that the expense incurred would preclude its use. The question naturally arises, then, as to the accuracy of the method which was used.

Averaged 5.78 Per Cent Total

During the three months of June, July and August after the chip packer had been put into use, and after the changes had been made which the study indicated would insure 6 per cent total SO_2, the acid actually made averaged 5.78 per cent total. There was, however, some variation in acid strength from day to day. The strongest acid produced was 6.65 per cent total, and the weakest 5.10 per cent total, and for 75 per cent of the operating time the total SO_2 content for the three months was between 5.5 and 6.5 per cent total. There was relatively little variation in combined SO_2 concentration, the minimum being 1.09 per cent and the maximum 1.28 per cent. Thus the relation between the predicted performance and that actually attained indicates that the simplified method of predicting performance which was used is reasonably accurate, and that it would have been well to have allowed for a "safety factor" to prevent occasional periods of lower acid strength.

H. N. Phillips Heads Salesmens's Association

The annual meeting of the Salesmen's Association of the Paper Industry was held at the Waldorf-Astoria on Tuesday, February 21, when the following officers were elected: President, Hugh N. Phillips, International Paper Company; Eastern vice-president, John D. Johnston, Gaylord Container Corporation; Western vice-president, John R. Diggs, Mosinee Paper Mills Company; Eastern assistant vice-president, H. A. Stone, Jr., Riegel Paper Corporation; Western assistant vice-president, Frank Prentiss, Hollingsworth & Whitney Company; secretary-treasurer, Dr. E. O. Merchant, 122 East 42d street, New York.

The 20th annual luncheon of the Salesmen's Association of the Paper Industry, held in the grand ballroom of the Waldorf-Astoria was one of the largest in point of attendance in the history of the Association with over 1100 present.

At the speakers table were the following: D. Clark Everest, president, American Paper and Pulp Association; Charles W. Boyce, executive secretary, American Paper and Pulp Association; Carl E. Whitney, counsel for the American Paper and Pulp Association; John T. Burruss, president, Salesmen's Association of the Paper Industry; H. N. Phillips, Eastern vice-president, Salesmen's Association of the Paper Industry; J. R. Diggs, Western vice-president of the Salesmen's Association of the Paper Industry; Dr. Neil Carothers, dean of the college of business administration of Lehigh University; and Dr. E. O. Merchant, secretary-treasurer of the Salesmen's Association of the Paper Industry.

President Barruss in introducing the first speaker remarked that this was the 62nd Annual Convention of the American Paper and Pulp Industry and that the speaker, Mr. Everest, was so widely known that he needed no introduction. In turn D. Clark Everest said in part: "As the sales managers and the salesmen of the industry you rate one-third of the credit for the industry's accomplishments. Actually in another sense, you dominate the industry because your effort has to do with income. It is with this item, income, that the industry meets its greatest problem. Over the years, I believe that comparative statistics of the major industries would show that the break-even point is highest in the paper and pulp industry. In other words, the paper and pulp industry must operate at a higher percentage of its capacity to meet its costs than most other industries.

"We are now starting a new year. The business prospects are improving daily. I believe that we have a real opportunity to improve the position of the industry. In all seriousness I ask you to think in terms of reasonable prices and to re-create in the minds of your customers a true idea of the real value that exists in paper and in the service that your companies and your industry render."

Dr. Neil Carothers, dean of the College of Business Administration of Lehigh University, spoke as follows:—

We had a World War, which demoralized the currencies of the world, destroyed the capital of the world, and left the economy of the world in a morbid and inflated condition. The inevitable result came in 1929, when the whole bloated structure collapsed in a world-wide depression, the most prolonged and tragic period of industrial stagnation and social distress modern civilization has had to endure.

Every nation grappled with this disaster as best it could. In our country our government embarked on a series of recovery measures the like of which had never been—an N.R.A., whose aim it was to restrict production and raise wages and shorten hours at a time when industry was already prostrate; an A.A.A. whose aim it was to tax the masses on their food and clothing to raise cash to pay farmers for reducing food and clothing, a spending policy whose aim it was to raise endless millions by loans or taxes and give them back through made-work and non-productive construction, a currency policy whose aim it was to debase the American dollar and force a spasmodic rise of prices, and a credit policy whose aim it was to establish an easy-money regime and reduce the rate of return on capital to the vanishing point, a reform policy whose aim it was to correct every industrial abuse and economic ill by summary legislation.

This is water over the dam, but it has a bearing on our problem today. Economics tells us that arbitrarily raising wages and shortening hours in time of depression intensifies the depression, that debasing the currency does not raise prices in depression but lays the foundation for a disastrous inflation after the depression is gone, that deficit spending provides a temporary stimulant which in the end leaves a nation debt-ridden and worse off than before, that artificial beating down of the interest rate gives little encouragement to investment but lowers the return to capital on which enterprise depends.

But the recovery tendency fought through these forces. It started timidly in 1932 but receded. It started again briefly in 1933. In 1935 it got a genuine start, moved forward rapidly in 1936 and early in 1937 reached the dimensions of an incipient boom.

And then, suddenly and violently, the tide turned backward, with a headlong fall of prices, industry stagnant, and unemployment at tremendous levels. What caused this disaster? No man can fix responsibility with absolute certainty. Recovery is never a royal road. It is, on the contrary, an erratic and irregular climb up a rough and rocky road beset with obstacles. The recession of 1937 was a natural phenomenon. Some setback in the rapid recovery movement was to be expected.

But it came first in this country, it came with startling violence, and it has been long and severe. Only special factors will explain its severity. First, there were the unhappy conditions abroad, with every nations' hand against the others, with billions of capital poured into unproductive armament, with a war in Ethiopia, in Spain, and in China. A second factor was the too rapid development of prosperity in 1936 and 1937, with too rapid a rise of prices, reckless increase of wages and salaries, an undue rise in stock prices, and too sudden a renewal of certain kinds of purchases. Finally, the weight of government policies pressed heavily on industry. An unwise tax law hampered production, an unwise labor law resulted in the most destructive labor warfare in American history, an uncertain currency policy dislocated the exchanges and destroyed confidence in investments, a reckless spending policy resulted in a

heavy burden of taxation and a series of appalling deficits which have fastened a vast load of debt on the American people.

In November 1937 I was asked to suggest a program to halt the recession. I set down a little program. It proposed that the government initiate negotiations with a view to a permanent stabiliation of the exchanges, with an aim toward eventual restoration of the gold standard, that the government amend the undistributed profits tax and the capital gains tax, that the government amend the Wagner Act, that the government begin the difficult task of restoring the administration of relief to the states, that the government make every effort to reduce expenditures to the absolute minimum necessary to administration and relief, that the government refrain from passing any laws setting the hours and wages of adult labor, that the government pledge itself not to compete with private industry in the sale or production of any commodity, that the government pledge itself not again to give a cash subsidy to any group or interest.

Since that simple little program was proposed, the government has adopted just one of those planks, the least important one. It has reversed three of them completely, with a new A.A.A., a new Wages and Hours Act, and worst of all a new spending policy. Apparently we have learned little from the incontrovertible evidence of the past six years.

What of the future? No man can tell. There are many unfavorable conditions. There is unrest abroad, and unstable exchanges and uncertain currencies throughout the world. At home the railroad situation is most unhappy, labor conditions are unsettled, wage levels are arbitrary and ill-adjusted both up and down, the burden of taxes is still heavy, governmental policies have made a wreck of agriculture, the building industry and the heavy goods industries are still anaemic. Remotely in the future there is the shadow of inflation. Fear still paralyzes investment and new enterprise. The shadow of government still looms over industry.

And with all this, recovery is ahead. A vast consumer demand awaits its chance. An enormous accumulation of capital begs an opportunity for honest profit under free enterprise. Industry is stripped for efficient action. Liquidation is complete. A wise and far-seeing government could in a few weeks light the fires of prosperity. But recovery will come with or without the aid of government, even despite errors of government. Our economic system cannot be stopped. War, depression, and unsound policies have hurt it. But even these have not been able to kill it. The coming year should show an irregular but substantial progress toward recovery.

Variable Speed Drives

Bulletin No. 15800, just issued by The Oilgear Company, 1391-1417 West Bruce street, Milwaukee, Wis., describes the new Oilgear precision variable speed drives. The equipment consists of a standard Oilgear fluid power transmission with micro servomotor stroke control cylinder, to adjust the pump stroke to give exactly the required hydraulic motor speed. The disc type D.T. unit is the usual form of speed control, while the pendulum type is recommended when the frequency error in the power supply is greater than the tolerable error in hydraulic motor speed.

Chemistry of Cellulose

"An Introduction to the Chemistry of Cellulose" by J. T. Marsh and F. C. Wood has just been published by D. Van Nostrand Company, Inc., 250 Fourth avenue, New York, N. Y. This is a 430-page book ($7.50) and is described by the author to be a relatively simple book which may act as a guide to the younger chemists who are entering those branches of our great industries which are concerned with cellulose.

The book is divided into five major divisions: (1) The occurrence and general properties of cellulose; (2) Dispersed cellulose; (3) Modified cellulose; (4) The derivatives of cellulose; and (5) The constitution and structure of cellulose. These are followed by an appendix giving density tables, author index, subject index and list of patent specifications.

Although no bibliography is included the volume is replete with reference to the work of research chemists and botanists throughout the world. For the investigator of fundamental cellulose problems the contents will save much search of the literature which has grown to tremendous proportions.

Descriptions are given of the many commercial processes such as rayon and cellulose derivative formation. Although the authors do not take a stand on the many controversial subjects dealing with cellulose they do an excellent job of pointing out clearly the conclusions expressed by the research workers.

For the paper mill research chemist the book offers an understandable review of the entire field of cellulose chemistry and gives in considerable detail a description of the general properties of cellulose including its colloid nature, sorption, moisture relations, capillary structure and pore size, optical properties, electrical properties and mechanical properties, all of which help to explain what happens to the fibers in the cooking, beating, refining and sheet forming operations.

Copies of this book may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd street, New York, N. Y.

Bird & Son Report $376,470

Bird & Son, Inc., report for the 1938 fiscal and calendar year consolidated net profits of $376,470, equivalent after preferred dividends, to 42½ cents a share on the 567,196 no-par common shares outstanding in the hands of the public at the end of the year. This compares with earnings of $1.40 per share on the common stock for 1937. Extraordinary net income in 1938 resulting from the sale of 14,100 shares of Building Products, Ltd., stock amounted to $579,870 and has been credited to the earned surplus account.

Finch, Pruyn & Co. Elect Officers

[FROM OUR REGULAR CORRESPONDENT]

GLENS FALLS, N. Y., Feb. 20, 1939—The annual meeting of stockholders of Finch, Pruyn & Co. was held here this week at which Maurice Hoopes was re-elected president. Other officers re-elected include George N. Ostrander, vice-president and secretary, and Fred B. Chapman, treasurer. Directors chosen for another term include the officers, Samuel Pruyn, Harold F. Bullard, Louis P. Brown, Paul Renn and Nellie M. Howe.

Michigan Superintendents Meet

KALAMAZOO, Mich., February 20, 1939—Members of the Michigan Division of the Paper Mill Superintendents Association held their February meeting at the Park American on Thursday evening with forty-one present. Following the dinner, chairman Ray L. Barton called the meeting to order. In memory of Dan Stacy, chairman of the Michigan Division last year, who passed away in January, a silent prayer was offered. Secretary Al Perlick read a detailed report of the Joint Meeting of the Superintendants and TAPPI held on January 5, also the financial report of the Michigan Division which indicated they were in excellent condition.

Announcement of the March meeting to be held on the 16th with Fred Stamm the speaker, giving an address on "Drying" and the selection of April 22 as the date of the Annual Ladies' Night, was made.

Sidney D. Wells Speaks

The speaker was Sidney D. Wells of the Institute of Paper Chemistry, Appleton, Wis., and his subject was "Paper Stock and Preparation". His talk covered the subject thoroughly and was based on practical experiments made at the institute and those observed in actual manufacturing operations. That part touching on the merits and results of the rod mill in stock preparation was especially interesting. Following his address a lively Forum took place and Mr. Wells answered scores of questions.

National President F. L. Zellers then spoke briefly on the program planned for the convention in June in Washington, D. C.

Chairman Barton called attention to the fact that two Charter Members of the association were present who had attended every National Convention, Mr. Noble and Mr. Breyfogle.

Those Who Attended

Those present at the meeting were:

F. L. Zellers, National President; R. L. Barton, chairman Michigan Division; A. L. Perlick, secretary treasurer Michigan Division; P. H. Tigwell, Beloit Iron Works; Arnold Weller, Sutherland Paper Company; F. L. Chappell, Hercules Powder Company; Sidney D. Wells, Institute of Paper Chemistry; L. H. Liberte, K. V. P.; E. C. Jacobi, A. E. Broughton & Co.; H. C. Bradford, Rex Paper Company; J. A. Wise, Kalamazoo Paper Company; Len H. Nimms, Kalamazoo Paper Company; Geo. A. Thompson Jr., B. F. Perkins and Son Inc.; H. B. Johnston, Allied Paper Company; F. L. Brown, Michigan Paper Company; B. M. Baxter, Bevis Machine Company; Homer E. Stafford, G. A. Fagerstin, Detroit Paper Produce Corporation; Paul Easton, Hercules Powder Company; Geo. C. Schmid and Paul de Guehery, Michigan Paper Company; W. K. Kidder, Allied Paper Company; Lloyd J. Lynd, R. B. Stewart, K.V.P.; A. H. Cole, Rex Paper Company; P. F. Neuman, Hercules Powder Company; Wm. H. Astle, Michigan Paper Company; John Tooker, Hawthorne Paper Company; Otto F. Fischer and Wayne E. Crotty, Bryant Paper Company; Arthur McPhillips, Simmons Worden White Company; C. "Baldy" Smith, Huron Milling Company; John A. Herman, Sutherland Paper Company; H. C. Pearson, Pioneer Paper Stock Company; Wm. Wessel, Harvey Hartman and Richard P. Aument, American Boxboard Company; M. S. Fogerty, Michigan Paper Company; C. H. Noble, A. E. Staley Manufacturing Company; L. H. Breyfogle, Draper Bros. Felt Company; O. W. Callighan, Edgar Brothers; W. S. Taylor, American Cyanamid Company.

January Newsprint Statistics

Production of newsprint in Canada during 1939 amounted to 208,382 tons and shipments to 201,852 tons, according to the News Print Service Bureau. Production in the United States was 77,264 tons and shipments 72,967 tons, making a total United States and Canadian news print production of 285,646 tons and shipments of 274,819 tons. During January, 22,543 tons of news print were made in Newfoundland, so that the total North American production for the month amounted to 308,189 tons. Total production in January 1938 was 317,866 tons.

The Canadian mills produced 14,118 tons less in January 1939 than in January 1938, which was a decrease of six and three tenths per cent. The output in the United States was 4,750 tons or six and six tenths per cent more than in January 1938, in Newfoundland production was 309 tons or one and four tenths per cent less, making a net decrease of 9,677 tons, or three per cent below January 1938.

Stocks of newsprint paper at the end of January were 167,968 tons at Canadian mills and 22,880 tons at United States mills, making a combined total of 190,848 tons compared with 180,021 tons on December 31, 1938. During the winter some tonnage is accumulating at points from which water shipments will later be made.

To Govern Sales Course

President Frank Vaughan of the Paper and Twine Club has designated the following as the Board of Governors regulating the operation of the Salesmen's Training Course of the Paper and Twine Club, in cooperation with the Industrial Training Corporation:

Frank Vaughan, Bay West Paper Company, Green Bay, Wis., chairman; E. P. Magel, Crescent Paper Company, Indianapolis, Ind.; R. W. Miller, The Central Ohio Paper Company, Columbus, Ohio; D. C. Everest, Marathon Paper Mills Company, Rothschild, Wis.; Al Southon, Kalamazoo Vegetable Parchment Company, Kalamazoo, Mich.; Alex Thomson, Jr., Champion Paper and Fibre Company, Hamilton, Ohio; John L. Richey, Cincinnati, Ohio.

This small group will be charged with the duty of passing upon the detailed course of training and the clinical program following that course, which is being sponsored by the club, in addition to passing upon all other routine matters governing the Sales Training Course. This board of governors has been selected because it is relatively close to Chicago, the center of operations of the Industrial Training Corporation, and because of the interest of the members in the work and their unquestioned ability to give advice and counsel in the administration of the plan.

George W. Goudy Dead

George W. Goudy, general representative, foreign manager and director of the Philadelphia Quartz Company, died February 7, 1939 in his sixty-ninth year, at his home in Highland, Ulster County, N. Y. He had been associated with the company over 40 years, having first served in the capacity of a salesman, assisting his father, Charles W. Goudy, who was traveling representative. His early experience as a soap manufacturer well fitted him for the position of aiding his father in validating the merits of silicate of soda, particularly in the manufacture of soap and paper.

Through more than 40 years of business life with the company, he saw the development of wider usefulness of the sodium silicates and, in the early twentieth century, contributed greatly to the establishment of the fiber box as a standard shipping container.

His kindly philosophy and keen wit endeared him to all who knew him. A favorite motto in dealing with others was, "Is it kind? Is it so? Is it worth while?" His advice was constantly sought by friends in and out of business circles, and so he became "Uncle George" to a great number of people from Coast to Coast, in Europe, in South America and across the Pacific.

During the last year and a half illness has prevented him from being active in his official capacity with the Philadelphia Quartz Company.

He is survived by his widow, Mildred Ritz Goudy and two sisters, Miss Arvilla Goudy and Mrs. Charles S. Woodruff.

To Meet in Savannah April 17-18

W. C. Strickland, president of the Southern Paper Trade Association has informed the Festival Committee that this organization will hold its annual meeting in Savannah on April 17-18 during the annual Southern Paper Festival to be held in the city at that time.

The Southern Paper Trade Association is one of the regional associations which make up the National Paper Trade Association and is formed of the paper jobbers in the United States to promote acquaintance and friendship.

The Southern Association embraces the States of Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas and Tennessee and at this annual meeting officers will be elected and committees appointed. Present officers of the association are W. C. Strickland, president, Strickland Paper Company, Birmingham, Ala., Ike Gronauer, vice-president, Memphis Paper Company, Memphis, Tenn., A. D. Cleveland, second vice-president, E. C. Palmer & Company, New Orleans, La., H. D. Newell, treasurer, Jackson Paper Company, Jackson, Miss., C. E. Dobson, secretary, 813 Carondelet Building, New Orleans, La.

The meeting of this association will be attended by its representatives from all of the States. Their headquarters will be at the De Soto Hotel, Savannah, Ga., where the Gold Room has been placed at their disposal for their meetings.

S. D. Warren Co. Had Smaller Net

The S. D. Warren Company, maker of fine papers, reports for year ended December 31, 1938, net profit after depreciation, interest and taxes of $164,364, equal to $1.62 per share on the 101,387 shares of stock outstanding. This compares with net profit in 1937 of $604,748 or $5.96 per share and with net profit in 1936 of $277,625 or $2.74 per share.

Shrinkage in profits last year was due to a smaller volume of business, with resultant increase in the burden of overhead, and to a slightly lower level of prices. Sales totaled $8,072,686, a decline of 15% from 1937. Tonnage shipments, also, were down approximately 15%. Shipments had been off sharply in the first half of last year, but in the closing six months were moderately ahead of those in the same 1937 period.

Operations throughout 1938 were at a rate of five days a week (with machinery running four shifts of six hours each). Currently they are higher, at 5½ days, or 22 shifts per week as against 20 a year ago. Prices have been marked up slightly, and wages also have been advanced 5 per cent.

As of December 31, 1938, S. D. Warren Company had current assets of $3,292,384 and current liabilities of $350,819, making net working capital $2,941,565, which compared with net working capital of $2,924,889 at the close of 1937. Cash on hand at the end of last year totaled $479,317, or well in excess of total current liabilities.

Fourdrinier for Southland Mills

The Pusey & Jones Fourdrinier to be installed at the plant of the Southland Paper Mills Inc. at Lufkin, Tex., is briefly described as follows:—

Stream flow, copper lined, welded steel flow box with high speed adjustable slice.

Fourdrinier part for wire 234 inch wide, 90 feet long, with 40 inch diameter suction couch, lump breaker roll, eight suction boxes, dandy roll, high speed duplex shake, adjustable pitch device and improved removable and wire handling arrangement.

Press part with two 36 inch diameter rubber covered suction press rolls, granite upper press rolls, presses equipped with pneumatic loading and lifting device, rubber covered felt rolls and motor operated felt stretchers.

Smoothing press comprising one rubber covered and one bronze cased roll without felt equipment.

Dry part with one 42 inch diameter, forty-eight 60 inch diameter paper driers and six 48 inch diameter felt driers; motor operated drier felt tighteners, enclosed small gear drive with improved lubrication.

Calender stack comprising 34 inch diameter bottom, 22 inch diameter next bottom and 16 inch top rolls equipped with motor lift and fitted with anti-friction bearings throughout.

Cameron winder with unwinding stands equipped with hydraulically operated friction brake.

All running parts mounted on anti-friction bearings and designed, constructed and balanced for 1500 feet per minute.

Schroon River Elects Officers

[FROM OUR REGULAR CORRESPONDENT]

Warrensburg, N. Y., February 20, 1939—Among the directors elected at the annual meeting of the Schroon River Pulp and Paper Company were Albert Emerson, Philip E. Rice, Franklin E. Pasco, Joseph Giannini, Walter S. Mack and Wallace Groves. Officers will be elected at a later meeting.

A. A. Schmon Heads Canadian Forestry

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., February 20, 1939—Montreal this past week has had a visit from two of the most prominent Americans in the twin industries of newspaper and newsprint production, namely Col. R. R. McCormick, publisher and editor of the *Chicago Tribune,* and Arthur A. Schmon, president and general manager of the *Chicago Tribune's* ally, the Ontario Paper Company, Limited. They came to attend the annual meeting of the Canadian Forestry Association, at which Mr. Schmon was elected president for the ensuing year.

In an address at the meeting, Col. McCormick said newspapers were part of the economic life of a country, and freedom of the press involved freedom for the individual citizens of a nation. Newspapers and dictators could not exist in the same country.

Known as the man responsible for the vast newsprint manufacturing enterprise recently established at Comeau Bay, Quebec, Col. McCormick drew attention to the importance of using high quality pulp in the manufacture of newsprint. Paper made from pine trees, or from old newspapers, was unlikely to take the place of newsprint from the Canadian spruce, he believed.

Considerable interest has been aroused here by the news from Pittsburgh that Dr. W. F. Hochstetter has announced the successful manufacture of newsprint from de-inked waste paper, with the claim that his invention would reduce the price of newsprint to $30 or $35 per ton.

Local experts have adopted a "wait-and-see-attitude" on this question, though they do not believe, in any event, that Canada's pulp and paper industry is in any immediate danger of increased competition from this source.

Col. McCormick, asked his view on the subject, said Quebec and Ontario had nothing to fear from this or, for that matter, from Southern pine, so far as good newsprint is concerned. "The pulp of Ontario and Quebec," he said, "makes better, cleaner newsprint, and the large newspapers will always demand the best material that is available."

Perry W. Lesh Made Director

[FROM OUR REGULAR CORRESPONDENT]

INDIANAPOLIS, Ind., February 20, 1939—Perry W. Lesh, president of the C. P. Lesh Paper Company of this city, has been elected to the board of directors of the State Life Insurance Company, one of the oldest local life companies, having a home office in this city. Mr. Lesh is a native of Indianapolis, a graduate of Shortridge High School and of DePauw University, where he was a member of Beta Theta Pi. He is vice president of the Indianapolis Community Fund and a director of the Y. M. C. A. and the Better Business Bureau.

Box Board Prices Advance

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., February 20, 1939—Practically all grades of box board advanced $2.50 a ton in the Boston district last week. Chip board is now quotable at $32.50, news board at $35.00, and single white patent coated news board bender caliper .020 and heavier at $57.50 per ton, all f. o. b. Boston.

R. M. Myers & Co. Under Chandler Act

R. M. Myers & Co., Inc., paper merchants of Rochester, N. Y., has taken recourse to an arrangement for reorganiration under Chapter XI of the Chandler Act. The petition was filed in the United States District Court of the Western District of New York on February 16, 1939 and the court order issued.

The company's latest balance sheet shows the company not only solvent but a substantial excess current assets over current liabilities.

The continued operation of this old established and well-known company has been authorized by the Court. The Court order also provides that the expenses of continuing the business during the time the R. M. Myers & Co., Inc., shall be before the Court are to be accorded priority over the debts affected by the arrangement, and that they are to be a charge against the assets of the company superior to such prior claims. The credit position of the company as respects its operation under the supervision of the Court would thus seem to be assured.

According to the plan of arrangement all claims under $20.00 are to be paid in cash, and the extension for various periods of the claims over this amount covered by the company's promissory notes with interest at 5 per cent the operation of the company continues with the present officers and management but with the treasurer, L. G. DeQuasie of L. G. DeQuasie & Co., Chicago and Rochester, management engineer, in complete charge of financial affairs. R. E. Myers, the president of the company is thus relieved to spend the major part of his time in sales effort.

Those interested in the company feel assured that it can be put on a profit-making basis because of the saving already effected ($1,000 per month), the renewed enthusiasm of the sales force, the increased sales power recently added. The ability to take advantage of all cash discounts will of course improve the situation.

Creditors may expect the customary court notices together with the details of the arrangement proposed by R. M. Myers & Co., Inc., within the next two weeks. The creditors will be solicited by the company for the purpose of securing their written acceptance to the arrangement.

Canada Pulp Exports Decrease

Exports of wood pulp from Canada during the calendar year 1938 totaled 554,037 short tons, according to preliminary figures just released by the Dominion Bureau of Statistics. The 1938 shipments were thus 316,679 tons, or 36.4 per cent below those recorded for 1937. All classes contributed to this decrease. The heaviest decline in volume occurred in shipments of bleached sulphite which dropped off 133,438 tons in 1938 as compared with 1937. Proportionately, the declines in shipments of unbleached sulphite and kraft pulps were even greater, but owing to the smaller volume in shipments of these two classes, the decrease in tonnage did not reach as great a figure. The United States continued to be the leading customer for Canadian pulp by a wide margin, taking 96 per cent of the unbleached sulphate (kraft), 85 per cent of the groundwood, 80 per cent of the unbleached sulphite, and 75 per cent of the bleached sulphite pulp shipments.

Lake States Discuss Lubrication

The Lake States Section of TAPPI meets regularly on the second Tuesday of each month for dinner and the presentation of a technical subject. The February 14th meeting held at the Conway Hotel in Appleton, Wisconsin was addressed by L. B. Penhallow, Lubrication Engineer, Wadhams Division of the Socony Vacuum Oil Co., who spoke on the subject of Lubrication. He presented first a sound motion picture which demonstrated by means of interesting animated diagrams the basic lubrication problems of bearings, gears, and cylinders. Mr. Penhallow then discussed means of applying lubricants, and supplemented the discussion by means of charts and samples of various types of lubricators such as bottle oilers, wick feed oilers, and forced feed lubricators. Both the picture and the discussion were well presented and very well received.

Among those attending were:

H. A. DuBois, R. J. Wells, A. C. McIntyre, J. Wollwage and E. H. Voigtman, Kimberly-Clark Corportion; W. A. Johnson, J. P. Weidner, F. Allard, M. Van De Laarschot, H. Sheldon and W. C. Christensen, Hoberg Paper Mills; R. G. Knechtges, A. I. Sippold, R. L. Smith and N. L. Malcove, Northern Paper Mills; Otto Kress, Duncan Brown, I. R. Probst, J. H. Graff, A. Erspamer and L. E. Simerl, Institute of Paper Chemistry; A. E. May, F. S. Young and M. L. Downs, Thilmany Pulp and Paper Company; Marin Phillips and A. Lewenstein, Appleton Coated Paper Company; H. A. Chure and Glenn Carroll, Combined Locks Paper Company; W. S. Grimes, Marathon Paper Mills Company; V. A. Woehler, Fox River Paper Corporation; Stephen Kukolich, Neenah Paper Company; R. C. Crain, Nekoosa-Edwards Paper Company; L. A. Moss, Whiting-Plover Paper Company; L. B. Penhallow, C. M. Cook and L. Beisel, Wadhams Oil Company; B. Cowan, J. W. Grimes and A. J. Hutchinson, Standard Oil Company; H. C. Olson, Bantam Bearings; G. H. Krohn, Globe Steel Tubes Company; H. V. Logan, Sivyer Steel Casting Company; R. A. Corbett, Chain Belt Company; P. A. Paulson, Consulting Engineer; R. L. Shaw, W. A. Jones Foundry and Machine Company; H. A. Schauer, Hasco Valve and Machine Company; David De Zurik, De Zurik Shower Company; James E. Watson, Wisconsin Wire Works; E. B. Nickles and G. A. Koebke, Manitowoo Engineering Works; E. E. Thomas, H. G. Cram Company; W. M. McGraw, General Electric Company.

Taggart Corp. Nets $5,528,179

R. K. Ferguson, president of the Taggart Corporation has submitted the following report in part to the stockholders of the corporation:

Net sales amounted to $5,528,179.74 in 1938 against $6,208,259.70 in 1937, a reduction of $680,079.96 resulting entirely from lower selling prices for paper and bags. Cost of goods sold declined $307,209.98 or 9.3 per cent compared to an average drop of 10.9 per cent in sales. Selling, administrative and general expenses amounted to $420,830.78 against $396,627.10 while taxes other than federal income taxes were $157,030.36 against $98,456.79 in 1937.

Net income after provision for federal income taxes amounted to $189,350.04 against $483,140.50 in 1937. During the year regular quarterly dividends were paid on the outstanding $2.50 preferred stock of the corporation requiring the disbursement of $72,500.63. Balance of net income available after preferred stock dividends amounted to $116,849.41 or 14.3 cents per share on the number of common shares outstanding.

During 1938 improvements and additions to property, plant and equipment amounted to $168,263.03 and working capital increased from $1,131,969.47 to $1,324,022.26, while notes payable totaling $224,625 were paid off and funded debt decreased $58,750.

At the annual meeting in 1938 the stockholders of the corporation approved the recommendation of the board of directors, to have the corporation engage as an operating company in the business of manufacturing and selling paper, bags and other containers by acquiring through the dissolution and complete liquidation of its wholly owned operating subsidiaries, Champion Paper Corporation, Taggart Brothers Company Inc. and Taggart Oswego Paper and Bag Corporation. All of the business, properties and assets of such subsidiary corporations were acquired and the existing liabilities, including the outstanding funded debt of the subsidiary corporations, were assumed by Taggart Corporation.

A sharp drop in the prices of kraft products required added efforts to lower costs so in June salaries were reduced on a graduated scale from 5 per cent in the lower brackets to 15 per cent in the upper. Furthermore, in December a 4 per cent wage reduction was negotiated with the officials of the various union labor groups and accepted by the mill employes. The management was able also to arrange with the holder of Taggart Oswego Paper and Bag Corporation 6 per cent mortgage a reduction in the rate of interest from 6 per cent per annum to 4 per cent per annum. Furthermore adjustments downward have been made with respect to contracts for the purchase of raw materials.

Navy to Participate in Paper Festival

The Navy's Crack Cruiser the U. S. S. Savannah will visit that Port during the Southern Paper Festival to be held there on April 17-18-19, coming there to honor that commemorative event in response to a special request made through Congressman Carl Vinson, chairman of the House Naval Affairs Committee. Local officials said it was more than probable that other vessels and a Coast Guard Cutter would also be present for the occasion and there is strong possibility of some of the Army units also participating. It is expected that the U. S. S. Savannah will carry a band which will participate in the two elaborate parades. The Cruiser is 608' in length of 10,000 tons and is the sister ship of the U. S. S. Philadelphia on which President Roosevelt took a cruise last year.

Elaborate plans have been made for the parade of decorated floats during the festival which is to feature "The Age of Cellulose". There will be individual floats representing each of the twelve Southern States with a princess from that state enthroned upon it.

A number of floats are also being entered by the paper companies, service clubs and other state organizations. It is anticipated that at least 40 decorated floats will be in the parade.

Improve Westminster Mill

A $30,000 addition to the plant of the Westminster Paper Company is now practically completed at New Westminster, B. C. This reinforced concrete building will add 90 by 108 feet to the present plant, thus providing a further 30,000 square feet of space. The present plant of the company covers over an acre of ground.

In its new plant the operation of existing equipment to full capacity will be possible. Formerly shortage of storage space and resultant congestion made it difficult to get maximum production from the available equipment.

With storage space available the plant will be able to produce fruit wrappers, wax papers and tissues for the British Columbia apple and the Australia fruit trades during slack periods and thus make it possible to give immediate delivery of these goods during the rush season.

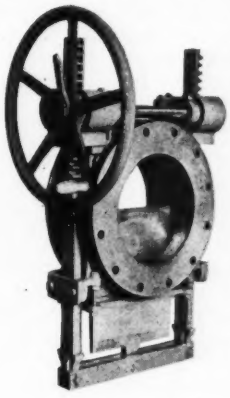
When the $30,000 plant addition is completed the investment in the plant of the Westminster Paper Co. will stand around one million odd dollars. The plant was established in 1922 by J. J. Herb and it has built up an export trade with 17 countries, of which Australia is the largest customer. It also does business in all the Canadian provinces. When the United States market had been developed to some extent the firm decided to erect a subsidiary plant at Bellingham, Washington, and this was completed in 1925 and has been operated since that time as the Pacific Coast Paper Mills. Fire gutted the New Westminster plant in 1929 and it was entirely rebuilt the following year. The plant has a daily capacity of 50,000 lbs.

RECORD "SELF CLEARING" PULP & PAPER MILL VALVES

(RESIDUE POCKETLESS TYPE)

Patented

This type was developed specially for controlling fibrous or sticky stocks of the various consistencies and temperatures required in modern mill service.



Furnished in sizes 3" to 48" inclusive, with all types of Record operating equipment, including cylinder and motor controls.

Illustrated is a 12" valve equipt with racks and pinions so arranged that valve may be installed in vertical pipe tank outlets or other locations of like nature.

Note that the operating equipment requires a minimum head room,—a worthwhile consideration.

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MESCO REGULATORS

For Stock Consistency

Operate on all the stock going through the stuff gate. It regulates all kinds of stock, in any volume and under any conditions. It responds instantly to density variation.

May be located any place in line where regulation is desired. Scores of them are in operation.

In operation in scores of plants, what service they are giving, and what they can be expected to do under your special conditions.

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Manufactured and Sold Exclusively by

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LOCKPORT, N. Y.

One Hundred Years of Paper Making

BOSTON, Mass., February 13, 1939—"One Hundred Years of Paper Making" which is "A History of the Industry on the Charles River at Newton Lower Falls, Massachusetts," is a book written by Clarence A. Wiswall in collaboration with his granddaughter Eleanor Bait Crafts.

Mr. Wiswall is a former paper manufacturer and later a paper box manufacturer. The book, printed by the Reading Chronicle Press, Inc., is a compilation of the history of the paper mills in the Newton Lower Falls section of Newton. The illustrations include old sketches of mills made many years ago, the interior of an early mill, portraits of early paper makers, a map of Newton Lower Falls, a medal, and a dam during the flood of 1886.

The book of 115 pages, representing a great deal of research and time, is highly interesting, giving facts in much detail.

Mr. Wiswall was born in Newton Lower Falls, Mass. When he was a small child the family removed, before the Civil War, to North Carolina, where his father was engaged as superintendent of a paper mill and where his boyhood days were passed. Several years after locating in the South, his father bought a mill which he operated successfully making coating and book paper. This mill was about the only one of its kind that ran through the Rebellion without interruption. The Confederate Government owed his father $100,000 (Confederate money), which they still owe.

About 1870 his father sold out his business and with his family returned to Newton Lower Falls. Here he bought another mill which he conducted until his death some years later.

His son, C. A. Wiswall, after completing his school course at the age of 18, entered the mill, learning the business from practical experience. On the death of his father in 1880 he continued the manufacture of paper until 1892 when he sold the mill.

Some years afterwards he removed to Reading, Mass., establishing, in connection with his son, Augustus, a paper box plant in Wakefield, Mass. He was treasurer of this concern for nearly 25 years, retiring in 1930.

Mr. Wiswall's hobby is collecting old postage stamps, of which he has many of the first issues secured as a boy in the mill. Another hobby is collecting leather bound books of Washington and the Revolutionary War.

Contemporary with many of the earlier paper manufacturers of Newton Lower Falls, entering the mill as a youth, he is the last survivor of the paper mill proprietors of his native place.

Goes With Knight, Allen & Clark

BOSTON, Mass., February 20, 1939—Eric D. Wallin, who has resigned as treasurer of the Arnold-Roberts Company, has joined Knight, Allen & Clark, Inc., as sales representative for Southeastern Massachusetts and the Providence district. He had been with Arnold-Roberts more than 30 years, going to the firm as a boy and working up to be successively vice-president and treasurer.

At the conclusion of duties February 11, Mr. Wallin was given a testimonial luncheon at the Boston Chamber of Commerce, at which company executives and employees presented him with a gold watch.

Peninsular Honors Employees

At a testimonial dinner attended by 170 in Ypsilanti, Mich., Peninsular Paper Company honored eight employees who have been with the company for a more than 25 years and all employees in turn honored Daniel L. Quirk, Jr., president, and Hon. Junius E. Beal, director. Mr. Quirk took up work at the mill on January 16, 1902 and Mr. Beal has been connected with the business since May 12, 1884.

D. T. Quirk, sales manager, on behalf of the employees presented his father with a handsome cocktail set. In accepting the gift, Mr. Quirk attributed the success of the business to the exceptional loyalty of employees throughout the 72-year history of the mill. He recalled the early days before he entered the business when the company made newsprint for the *Chicago-Tribune* and had two mills, one on either side of the river so that fire or other calamity would be least likely to stop manufacture entirely. Fire actually did occur in the north side mill in 1898, but production was not long interrupted.

Mr. Beal, a member of the board of directors and long a regent of the University of Michigan, was presented with a silver plaque by D. L. Quirk, Jr.

The group of seven employees who have been longest with Peninsular were also introduced by Mr. Quirk and presented with electric calendar clocks, each bearing a plaque carrying the date of entering the employ of the mill and the date of February 4, 1939. Those receiving the clocks were Mrs. Alta Shaw Kirk, July 7, 1900, office; Charles Block, April 15, 1904, tour foreman; Michael Gavin, June 10, 1904, beater engineer; Fred Holly, September 15, 1904, processing foreman; J. J. Ely, February 15, 1912, charge of manufacturing; E. C. Robtoy, February 1, 1913, traffic manager; Joseph Block, April 15, 1913, cutter room foreman.

Union Bag Completes Financing

New financing by the Union Bag and Paper Corporation has raised the corporation's working capital to approximately $3,100,000 and resulted in a ratio of current assets to current liabilities of over 4 to 1, according to a statement made by Alexander Calder, president, in which it was announced that the company's new financing has now been completed.

Sale of new securities has also resulted in a presently outstanding funded debt of only about $5,050,000, Mr. Calder said; of this $4,600,000 consists of loans by two insurance companies. The remainder of the funded debt in the amount of approximately $450,000 consists of notes given in connection with timberland purchases which mature at various dates up to January 5, 1943.

New financing for the corporation consisted of two long-term note issues of $2,300,000 each sold to the Metropolitan Life Insurance Company and The Prudential Insurance Company of America, and of 210,455 new shares of capital stock. Of the new stock, 160,105 shares were sold to stockholders and 30,203 shares to employees; the balance of 20,147 shares was taken by an underwriting group headed by E. H. Rollins & Sons Incorporated and Blyth & Co., Inc. The loans made by the two insurance companies mature over a 12-year period; the first maturity occurs January 1, 1941, in the amount of $150,000.

PAPER AND PULP MILLS
CHILLICOTHE, OHIO
KINGSPORT, TENN.
BRUNSWICK, GA. (50% Ownership)

BOARD MILLS
KNOXVILLE, TENN. LYNCHBURG, VA.
NASHVILLE, TENN. SYLVA, N. C.
HARRIMAN, TENN. PORT ST. JOE, FLA. (50% Ownership)

EXTRACT PLANTS
KNOXVILLE, TENN. LYNCHBURG, VA.
NEWPORT, TENN. RADFORD, VA.
HARRIMAN, TENN. SYLVA, N. C.

WHEELWRIGHT DIVISION
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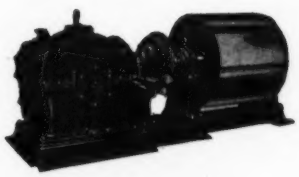
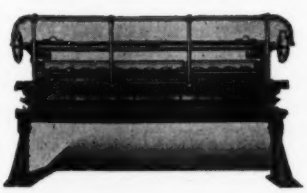




QUALITY . . SPEED . . PRODUCTION

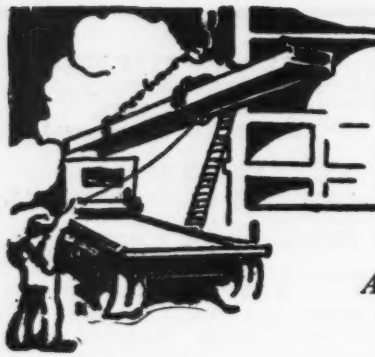
THE reduction of manufacturing cost and general improvement in range and quality of papers points directly to the advisability of modernizing existing paper machines, or replacing obsolete equipment with modern units.

The continuous cumulative cost of repairs and shutdowns, with attendant losses in production and quality, soon approaches the cost of new equipment.

During recent years many new developments have been brought out, all of which are applicable to existing machines, and in many cases these improvements can be made the means of improving mill conditions without excessive cost.

An opportunity to discuss possible requirements will be appreciated, and preliminary surveys made without obligation.

THE BAGLEY & SEWALL COMPANY--Watertown, New York



CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, Financing and Operation of Pulp and Paper Mills

General Construction News

Neenah, Wis.—The Kimberly-Clark Corporation, manufacturer of cover paper stocks, wall papers, etc., has plans for one-story addition to local mill on North Commercial street, and will place superstructure under way soon. It will be used for general shop service. No estimate of cost announced. Company has approved plans for new steam power house at branch mill at Niagara, Wis., used for production of book papers, to be 60 x 90 feet, and about 80 feet high. Installation will include boiler units and accessories, pumping machinery and auxiliary equipment. An award for excavations has been made to the C. R. Meyer & Sons Company, 50 State street, Oshkosh, Wis., and work will be placed under way at once.

Niagara Falls, N. Y.—The Falls View Box Company, Inc., recently organized with capital of $100,000, plans early operation of local plant for the manufacture of a line of paper boxes and containers. New company is represented by Strebel & Strebel, Liberty Bank Building, Buffalo, N. Y., attorneys.

Kansas City, Kan.—The Agar Manufacturing Corporation, Thomas street, Whippany, N. J., manufacturer of corrugated boxes and containers, has selected site on Kansas avenue, Kansas City, Kan., for proposed new plant, recently referred to in these columns, to be located in the Greater Kansas City district. A general contract for erection has been awarded to the Fogel Construction Company, Reliance Building, Kansas City, Mo., and work is scheduled to be placed under way at once. Plant will consist of a main one-story manufacturing building, 150 x 400 feet; one-story corrugating stock unit, 60 x 320 feet; one-story storage and distributing building, 150 x 400 feet, with boiler section, 40 x 60 feet, and office building, 40 x 102 feet. It is estimated to cost close to $185,000, including equipment, which will provide for large production.

Chicago, Ill.—The Royal-Continental Box Company, Inc., 308 North Leavitt street, manufacturer of corrugated paper boxes and containers, has plans under way for rebuilding of plant at location noted, recently damaged by fire. The structure is one-story, 120 x 125 feet, and occupied under lease. Work is estimated to cost close to $50,000, including equipment installation, replacing machinery damaged in the fire.

Stevens Point, Wis.—The Whiting-Plover Paper Company, manufacturer of writing papers and kindred stocks, has approved plans for alterations and improvements in Building No. 4 at mill. Contract for work has been let to the C. R. Meyer & Sons Company, Oshkosh, Wis., and will be placed under way at once. No estimate of cost announced.

Cleveland, Ohio—The Smith-Lustig Paper Box Manufacturing Company, 2630 Payne avenue, manufacturer of corrugated paper boxes and containers, has work under way on alterations and improvements in plant, and will carry out project by day labor. No estimate of cost has been announced. Sidney A. Smith is president.

Milwaukee, Wis.—The A. George Schulz Company, 433 West Clybourn street, manufacturer of folding paper boxes, etc., has work in progress on new boiler house at factory, recently referred to in these columns, and will have structure equipped and ready for service at early date. Work also is under way on improvements and expansion in plant, to include installation of a new corrugating machine and auxiliary equipment. Program is reported to cost approximately $60,000, including equipment. Edward Steigerwald & Sons, Inc., 5310 West State street, Milwaukee, is general contractor. Frank F. Drolshagen, 647 West Virginia street, is architect.

Lynn, Mass.—Fire recently damaged a portion of building at 125-27 Oxford street, occupied in part by the L. P. Purington Paper Company, paper goods, for storage, distribution and offices. Plans are said to be under way for early rebuilding. An official estimate of loss has not been announced.

New Companies

New York, N. Y.—The Crescent Paper Supply Corporation has been incorporated with capital of 200 shares of stock, no par value, to deal in paper products. New company is represented by Maxwell Goldstein, 270 Broadway, New York, attorney.

Statesville, N. C.—The North State Box Company has been chartered with capital of $100,000, to manufacture and deal in folding and other paper boxes, corrugated shipping containers for furniture specialties and other products. It is proposed to operate a local plant at early date.

Rockingham, N. C.—The Southern Tissue Mills, Inc., has been incorporated with capital of $200,000, to operate a mill in this vicinity for the manufacture of tissue papers and other kindred stocks. Incorporators of new company include W. H. Howe and Fred W. Bynum, both of Rockingham.

Hanover Paper Co. Gets Toilet Order

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., February 22, 1939—During the week ending February 11 the Veterans Administration contracted with the Hanover Paper Company, New York City for $20,310.00 worth of toilet paper under the Walsh-Healey Act.

Dexter Mill to Continue

[FROM OUR REGULAR CORRESPONDENT]

DEXTER, N. Y., February 20, 1939—An official of the Department of Labor was sent here during the last week in response to the petition bearing several thousand names of residents in this section interested in the continuation of operations at the Dexter Sulphite, Pulp and Paper Company. After investigating the situation, however, the government official declared the situation to be well in hand, leaving nothing to be done at this time.

Prior to leaving he issued a statement complimenting Attorney Cornwall for his part in preventing liquidation of the company assets and blocking permanent shutdown of the plant, thereby throwing over 300 hands into idleness. He also stated that the petition was presented to President Roosevelt who immediately referred it to the Secretary of Labor.

Upon arrival here he found that the company officers, Mr. Cornwall and the Reconstruction Finance Corporation had the situation well in hand with prospects that the mill would continue in operation for some time. Signers of the petition pointed out that the population of Dexter consists of about 4,000 persons directly affected by the mill operation.

The company spends about $1,000,000 a year, it was pointed out, and liquidation would have a devastating effect upon this entire section; many people would lose their homes, business of the village would receive a death blow and the village itself shrink in population. President Roosevelt was asked to do all possible to insure continued operation. Attorney Cornwall declared that it would require a few days to prepare his petition to the federal court for an equity receiver under whom the plant will continue to operate.

Indianapolis Shows Slump

[FROM OUR REGULAR CORRESPONDENT]

INDIANAPOLIS, Ind., February 20, 1939—Reports from local paper jobbers indicate that February trade in fine papers has slumped somewhat from the January volume. This was a little unexpected in view of price rises that had been made. Book papers in particular had a good demand before rises were put into effect and it is known that stocks are not heavy in consumer hands. The trade is expecting some business almost immediately from consumers who have been using their old stocks, laid in before any price increase. Other papers which go to the printing trade are moving only in fair volume. Some inquiries are being made but much prospective work is being held up until near actual spring.

Demand for building paper continues heavy for this time of the year. The entire winter has been very good for both roofing and building papers, due to open weather conditions and spring operations should start early. While last year was good, jobbers expect the coming season to be far better.

Box manufacturers are holding operations to immediate consumption. It is expected that after the first of the month production will be stepped up in order to build up warehouse stocks against a possible increase in demand. Container factories are in much the same position.

Jobbers say demand for wrapping paper and bags is improving slowly but that the larger cleaners and laundry plants are making inquiries that indicate increased volume during March. Tissues are moving fairly well with no change in prices.

STORA QUALITY 32

"The Standard for Comparison"

What this means to you as a buyer of pulp:

"The standard for comparison" is not an adopted slogan. It is an expression used by many informed chemists and buyers during the past seven years as a result of its outstanding performance.

STORA QUALITY 32 is "the standard for comparison" because it is a product of a company whose great resources and experience are entirely directed in the manufacture of quality materials.

STORA QUALITY 32 is "the standard for comparison" because Stora insists upon maintaining a rigid standard in its manufacture.

STORA QUALITY 32 is "the standard for comparison" because it combines great strength with high color. It sets a higher standard in cleanliness and its fibres are permanent and will not revert in color or strength. Besides, Stora constantly aims to process a better pulp,—a pulp that will give even greater values.

Stora Kopparberg Corporation

No. 230 Park Avenue, New York

PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.

Henry J. Berger
EDITOR

Ronald G. Macdonald
Editor Technical Section

Lynne M. Lamm
Washington Correspondent

Vol. CVIII New York, February 23, 1939 No. 8

THE YEAR IN PAPER

Total production of all grades of paper in 1938 is estimated at 11,327,500 tons, against a capacity of 15,354,000 tons, and compared with a production of 12,837,003 tons in 1937. The best showing was made in newsprint and in wrapping paper which equalled 82 per cent.

Newsprint production in 1938 was similar to the year 1931 and only 24,000 tons larger. Canada produced nearly 2,625,000 tons or 71 per cent; United States 820,000 tons or 22 per cent, while Newfoundland produced 268,000 tons or 7 per cent. The decrease compared with 1937 was 28 per cent in Canada, 13 per cent in the United States, and 23 per cent in Newfoundland. Canadian output was slightly above that of 1934, production in the United States the lowest in any year since 1903, while Newfoundland tonnage was approximately the same as in 1933.

Manufacturers in Canada experienced a difficult year in 1938 when the decline in general business activity in the United States, with other adverse factors, lowered newsprint production some 1,043,000 tons and shipments 1,138,673 tons below the record production of 1937. Against this decline in output the industry achieved a notable advance in breaking away from the old price tradition that the prevailing price of all mills should be set by the lowest contract price quoted by any one mill. Leading Canadian producers maintained an unbroken front and preferred to lose tonnage rather than reduce the price of newsprint below $50 per ton. As a result of this policy a price $7.50 per ton higher than in 1937 prevailed. Although this higher price was in a measure offset by increased costs and the earnings of mills were inadequate, the net result of the year is not as bad as the sharp drop in shipments alone might indicate.

Canadian shipments of newsprint to the United States totaled 1,938,000 tons, which was a decline of 961,000 tons or 33 per cent less than in 1937. Overseas shipments totaled 486,000 tons, a decline of 70,000 tons or nearly 13 per cent less than the previous year. The total rated capacity of Canadian newsprint mills in 1938 was 4,204,300 tons, a fair advance over the capacity of the preceding year. For 1939, the estimated addition to the 1938 capacity is about 103,000 tons or an increase of about 2.4 per cent. This is due to the full operation of the new Ontario Paper Company mill at Comeau Bay, which is designed for the production of 120,000 tons of newsprint annually.

Book paper production declined about 17 per cent in 1938, the output of uncoated book paper being estimated at 1,296,000 tons, against a capacity of 1,900,000 tons, and compared with an output of 1,561,074 in 1937.

Writing paper production for 1938 is estimated at 510,000 tons, against a capacity of 732,000 tons, and compared with an output of 584,147 tons of the preceding year. Shipments in the last quarter of 1938 were 38 per cent higher than the very depressed last quarter of 1937. In the first six weeks of 1939 writing paper shipments were 18 per cent higher than the same period last year.

Kraft paper manufacturers experienced a difficult year in 1938 and although the volume of tonnage was only 4 per cent below that of 1937, a wild competitive scramble for business during the second half of the year forced prices down to a wholly inadequate level. Producers had to struggle, not only with greatly reduced volume in the early months of last year, but also with problems resulting from overexpansion of capacity. At the end of the year, however, it was evident that producers had made definite progress in adjusting themselves to these problems. The outlook for 1939 is favorable.

The paper board division of the industry made a better showing than had been anticipated. Total production in 1938 is estimated at 4,840,000 tons, which is a decrease of about 11.25 per cent below the all-time record of 5,466,600 tons in the preceding year. The continued growth of the paper board division in relation to other branches indicates the success attained in developing new uses for the products and facilities for supplying demands. The year 1938 opened with only about one-third of the amount that was on hand in January of the previous year and remained at a low level throughout the year except for the seasonal upturn during the fall. Analysis shows an average annual growth of 151,000 tons or about 3.7 per cent, of which box board represents gains of 52,000 tons or 2.5 per cent, and container board 99,000 tons or 4.8 per cent. During 1937-38, new capacity now in operation, added 668,000 tons yearly to the container board mills.

The wood pulp industry passed through a trying year as declining general business activity forced a curtailment in the production and consumption of all grades of wood pulp. The total domestic production declined from 6,664,100 tons in the previous year to

an estimated 5,640,000 tons in 1938. Imports in 1938 of all grades of pulp totaled 1,722,400 tons, compared with 2,394,539 tons in the preceding year. The effect of high prices in 1936-37 created difficulties for both producers and buyers and necessitated revision of contracts with readjustments of prices, tonnage and periods of delivery. With the exception of the prices of mechanical, and soda pulp, which remained at a notably stable level during the year, the price structure of other pulps was unstable and under the influence of declining demand the wood pulp market was sluggish.

On the whole, the year 1938 may be regarded as the most trying period which the pulp industry has passed through in many years.

The increasing importance of bleached sulphate Kraft pulp in competition with bleached sulphite may be noted. Bleached kraft pulp in various degrees of whiteness has grown in popularity in recent years and is gradually replacing sulphite pulp in some cases because of its greater strength and steady improvement in quality.

Government Paper Bids

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., February 22, 1939—The Government Printing Office has received the following bids for 74,800 pounds (800,000 sheets) of 32 x 42 white sulphite writing paper: Paper Corporation of U. S., 6.15 cents; Old Dominion Paper Company, 5.845 cents; Barton, Duer & Koch Paper Company, 5.8 cents; R. P. Andrews Paper Company, 6.76 cents; Stanford Paper Company, 7.1 cents; Whitaker Paper Company, 6.03 cents; Mudge Paper Company, 6.346 cents; Cauthorne Paper Company, 6.42 cents; Aetna Paper Company, 7.07 cents; Marquette Paper Company, 5.39 cents; Mathers-Lamm Paper Company, 6.33 cents; and Thomas Barrett & Son, 7.2 cents.

For 7,800 pounds (100,000 sheets) of 75 per cent rag, lithograph finish map paper; Mudge Paper Company, 12.28 cents; Butler Company, 15.99 cents; Barton, Duer & Koch Paper Company, 12.05 cents; R. P. Andrews Paper Company, 12.09 cents; Stanford Paper Company, 12.5 cents; Mathers-Lamm Paper Company, 14 cents; Old Dominion Paper Company, 14.13 cents; Walker, Goulard Plehn Company, 12.58 cents; Paper Corporation of U. S., 13.57 cents.

Norfolk Mill Not To Close

[FROM OUR REGULAR CORRESPONDENT]

NORFOLK, N. Y., February 20, 1939—An official of the St. Regis Paper Company declared this week that reports that the local plant would suspend operations were without foundation. He declared that business has been a little slow at the local branch during the past few weeks, part time operations being observed, but the mill is not to be shut down.

This official of the company also stated that it was impossible to say how steady the mill would be operated as everything depended on the orders received.

Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association.

COMPARATIVE MONTHLY SUMMARIES[1]

Months	1939	1938	1937	1936	1935	1934
January	77.3%	63.9%	90.3%	76.1%	65.8%	.....
February	.....	68.7%	90.1%	77.9%	70.0%	.....
March	.....	69.6%	90.3%	76.0%	70.5%	.....
April	.....	68.3%	92.1%	82.3%	70.0%	.....
May	.....	69.0%	90.6%	81.6%	69.4%	.....
June	.....	66.0%	87.3%	80.7%	72.3%	.....
July	.....	72.0%	81.8%	77.3%	64.9%	.....
August	.....	77.2%	82.9%	81.5%	70.9%	.....
September	.....	76.3%	78.6%	80.5%	71.9%	58.2%
October	.....	82.5%	73.5%	87.6%	75.6%	64.7%
November	.....	79.6%	61.9%	88.0%	75.3%	61.7%
December	.....	74.4%	54.5%	85.9%	71.2%	59.6%
Year Average...	.....	72.3%	80.6%	81.3%	70.5%	.....
First 6 weeks...	78.4%	65.1%	89.9%	76.5%	66.4%	.....

COMPARATIVE WEEKLY SUMMARIES[1]

CURRENT WEEKS		CORRESPONDING WEEKS	
January 7, 1939	69.9%	January 8, 1938	59.2%
January 14, 1939	80.4%	January 15, 1938	62.3%
January 21, 1939	78.2%	January 22, 1938	66.0%
January 28, 1939	81.1%	January 29, 1938	68.1%
February 4, 1939	81.2%	February 5, 1938	67.1%
February 11, 1939	81.2%	February 12, 1938	68.0%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting—Current Weeks					
Ratio Limits	Jan. 7, 1939	Jan. 14, 1939	Jan. 21, 1939	Jan. 28, 1939	Feb. 4, 1939	Feb. 11, 1939
0% to 50%	90	64	62	67	51	37
51% to 100%	217	242	241	232	228	158
Total Mills Reporting..	307	306	303	299	279	195

PAPERBOARD OPERATING RATIOS*

Percents of operation based on "Inch-Hours" reported to the National Paperboard Assn.:

Year	Jan.	Feb.	Mar.	Apr.	May	June
1935	62%	68%	68%	63%	61%	66%
1936	62%	67%	67%	70%	69%	70%
1937	80%	86%	86%	88%	85%	77%
1938	54%	60%	61%	57%	58%	56%

Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1935	62%	67%	71%	77%	71%	61%	66%
1936	69%	75%	78%	82%	80%	74%	72%
1937	66%	74%	69%	65%	55%	45%	73%
1938	57%	66%	66%	70%	65%	59%	61%

Week end. Jan. 7, 1939—45%
Week end. Jan. 14, 1939—62%
Week end. Jan. 21, 1939—65%
Week end. Jan. 28, 1939—68%
Week end. Feb. 4, 1939—66%
Week end. Feb. 11, 1939—69%

[1] Capacity-production ratios are based upon six-day capacity ratings which are adjusted periodically to correspond with the ratings reported by individual companies. Ratios are subject to revision until all reports are received.

* Monthly ratios revised February 16, 1939.

France Uses More Wood Pulp

WASHINGTON, D. C., February 20, 1939 — For several years French production and distribution of wood pulp has become increasingly important, according to reports from the office of the American Commercial Attache, Paris. French forest reserves have not been sufficiently developed to supply the necessary quantities of wood pulp to meet the diversified demand, hence imports of wood pulp have greatly exceeded domestic production and European countries as well as Canada and the United States have been drawn upon for the pulp requirements of French industry. It is unfortunate that no official compilation of domestic production exists and that available trade statistics are conflicting. It is too early yet to estimate definitely the production of wood pulp in France during 1938. Production indices of the principal industries concerned in the utilization of wood pulp indicate a slowing up in activity in 1938, and estimates from the industry also point to a production lower than that of 1937—361,000 metric tons.

"NON-USERS ARE THE LOSERS"

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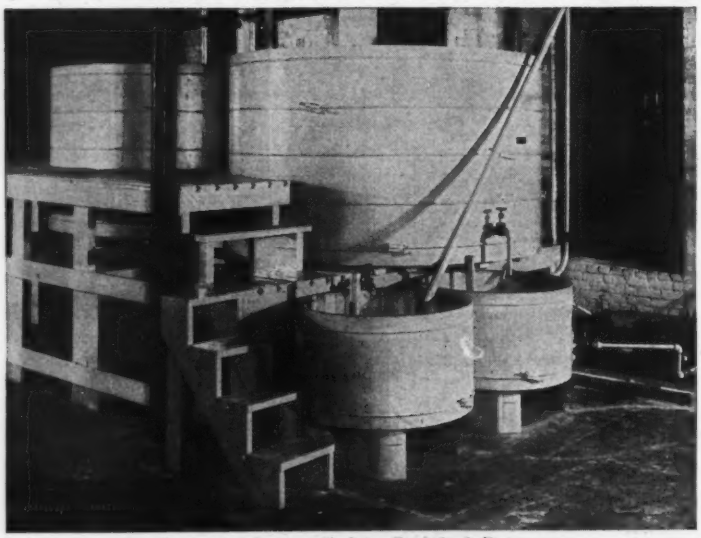

Cypress tanks installed for Pattilloch Process at Hawthorne Paper Co., Kalamazoo, Mich.

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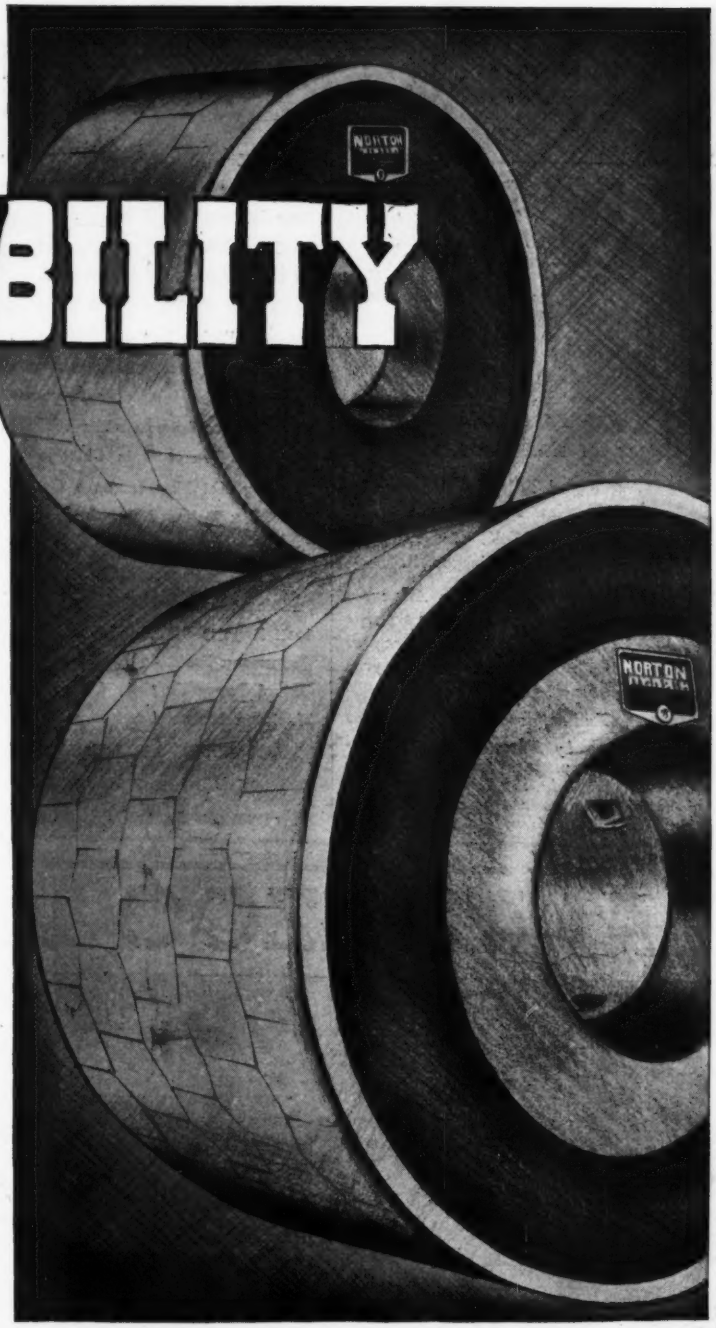

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